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VOL. 9
NO. 10
OCTOBER 1941

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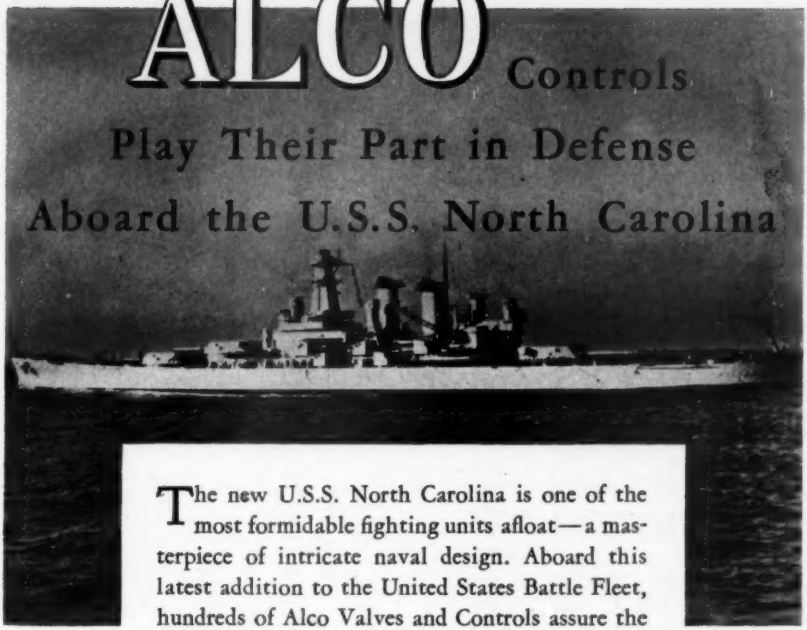

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The Refrigeration Service Engineer

Vol. 9 No. 10

October, 1941

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
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Cover

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MANPOWER AND MATERIALS
KEYS TO NATIONAL DEFENSE
-they must be conserved

Defense requirements must come first. Demands are heavy—will be heavier—and they must be met. Hence, it is a patriotic duty to conserve manpower and materials—the twin keys to National Defense.

In laying out refrigeration and air conditioning installations, it is necessary to consider these factors. As the army grows—capable service men will be fewer—the answer is equipment that requires minimum service. If equipment is ineffective and has to be replaced, added and unnecessary loads are thrown on production machines needed for turning out military supplies. Additional materials must be used which may be needed elsewhere. Select equipment that won't have to be replaced.

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The Refrigeration Service Engineer

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Another Emergency Job

REFRIGERATION service men thrive on emergency calls. Much of their work is necessarily the type that the purchasers of refrigeration equipment would like to get along without, but mechanical equipment is subject to the indisputable law of "wear" and consequently in the long run experienced repair and maintenance service furnishes an essential service designed to prolong the life of the equipment. So usually most calls for the service engineer are emergency calls and his business is dependent upon the quality of the service which he performs.

Today another important emergency call awaits the service engineer's prompt attention. It probably is the most "urgent" emergency call he has yet received. Recently an entirely new and unexpected condition has arisen which has outmoded previous business operations. The service engineer may be rightly included in that large classification of small business operators we have been reading so much about in the press these past several months. The present emergency job requires fast action.

Some recognition to the importance of the service field has been given in the issuance of a priority rating of A-10 on preference rating order P-22 for repairs and replacement parts.

Refrigeration Essential for Civilian Morale

As a group, service engineers are fully cognizant of the emergency crisis which confronts our country today. Practically every industry feels that they are indispensable to the nation's existence in this emergency. In the final analysis, how many can legitimately claim the position of the refrigeration industry? Who can deny that if tomorrow a "blackout" in the industry should occur that this very vital function of protecting the nation's food supply would cause a serious setback to all of the defense plans now in progress? Is it necessary to repeat that the preservation of perishable food products and conservation by refrigeration is the "army behind the army" in maintaining the country's first lines of defense.

Perishable Foods Will Win War

The Honorable Secretary of the Agricultural Department, Claude Wickard, calls food his "Fifth Columnist." He says it will win the war and dictate the peace and he wasn't thinking entirely of wheat and grains. The grain production is well taken care of with surplus amounts carried over from past years. The big job in which the Department of Agriculture is most concerned with is the increased production of eggs, poultry, meats, butter, milk and fats, in which it is expected that a 25% increase in production can be accomplished. Food of high nutritive values—rich in proteins and vitamins—are necessary to build a strong nation and are as essential as steel, aluminum and copper in actual war defense work. The big program of the Agricultural Department is that production of perishable foods *must be increased.*

What about the refrigeration equipment required to properly maintain this food from producer to consumer? It's a vital story and a big job. The keystone to the entire problem is that group of men who must keep the refrigeration equipment functioning without any interruption.

Emergency service—yes—not only in maintaining existing equipment but to see that the industry is furnished its full share of new equipment to do this job properly. It is an important defense measure for the civilian population. The story of refrigeration cannot be repeated too often and the service engineer is in the most desirable position to broadcast this message because of his intimate contact with the consumer. It is not sufficient that the story be told to customers only, but the aid of local Health Departments must be enlisted as well as the proper Governmental Departments. Senators and representatives can be effectively used in seeing that refrigeration is accorded due recognition. How much work there is to be accomplished along this line is shown recently in the lack of knowledge as to what refrigeration means to the public health. A parts jobber addressed a communication to his senators and representatives, outlining the necessity for the necessary supply of equipment and repairs. In acknowledging this letter one senator indicated that he knew the jobber appreciated a sacrifice must be made in the emergency and that possibly domestic refrigeration might be considered in the category of luxury goods. Suffice it to say that his opinion was immediately changed after the story was properly presented to him.

Jobber Distribution Needed

The existence of the service and maintenance man in performing this necessary function is dependent upon his ability to secure materials through the distribution provided by the jobbers now established. They represent his storehouse for supplies with thousands of dollars worth of inventory stock for immediate use.

Let us, therefore, take every advantage in seeing that the refrigeration story as used for the preservation of foods is repeated as frequently as possible. In numerical strength the refrigeration service engineer commands a position of tremendous importance. "Defense needs refrigeration" and the refrigeration industry represents one of the nation's first lines of defense.

The Open and Sealed Type Norge Refrigerators

A COMPLETE description of the construction, operation and servicing of Norge domestic units was contained on page 3 of the October, 1934 issue of THE REFRIGERATION SERVICE ENGINEER. Any information contained therein will not be repeated here since it is the purpose of this article to bring the information up to date.

From 1934 through 1938 the Norge system remained basically the same. That is to say, the system continued to be of the belt-driven, open type, employing the Norge Rollator compressor and a low side float control. SO_2 was the refrigerant.

Some changes in the specifications occurred, most interesting of which to the service engineer will be noted in Table 1 and, of course, changes in the cabinet construction, appearance and convenience took place from year to year.

The first major change in the system occurred in 1939 when the low side float was replaced with a high side float and the style of the evaporator changed to one suitable for high side float control. During the year three lines of refrigerators were produced. The first line including the Models M-5, M-6 and M-8 refrigerators were the conventional high side float type charged with SO_2. The second line was the Norge hermetic un't used exclusively in succeeding years and which will be discussed a little later in this article. In addition there was a special line including the Models S-5, S-6 and S-8, which employed a unique type of system.

Known as the C/M synchronizer, it employed new principles which were developed for the purpose of improving humidity conditions in the refrigerator. The name C/M was derived from the colder-moister conditions achieved.

The evaporator has an inner section held at a low temperature for freezing ice cubes and an outer section held at a higher temperature which cools the cabinet. The two temperature zones were made possible by employing two refrigerants with widely different boiling temperatures mixed within the same system.

That portion of the cooling unit which cools the cabinet has a very large surface area which makes it possible to reduce the temperature difference between cooling surface and cabinet temperature. In this way colder cabinet temperatures can be maintained with higher relative humidity.

The system contains a mixture of SO_2 and Freon 12. The two circulate together in a single system which is shown diagrammatically in Fig. 1.

The action of the two refrigerants might be compared to the alcohol and water solution in the radiator of your car. Alcohol has a lower boiling temperature than water and because of this the alcohol will boil off first when the motor warms up sufficiently, leaving only water in the radiator. In the C/M system, the refrigerant mixture enters the freezer shelves first where the Freon 12 boils out at a low temperature. This temperature is too low to cause the SO_2 to boil, therefore, the SO_2 passes into the outer evaporator where it evaporates at a higher temperature. The compressor used on this system is the Norge Rollator open type. The mixed vapors are drawn through the compressor and compressed in the condenser. In the liquid form they pass from the condenser to the high side float valve where they are again metered into the evaporator.

Norge Hermetic Unit

Introduced in 1939 and employed exclusively in succeeding years is the Norge hermetic unit. Table 1 does not contain any data on these units because no oil or refrigerant charges are available. Like other makes of hermetic units, no adjustments can be made in the field on the sealed portion of the unit and it is recommended that it be returned to the factory for repairs.

The motor, Rollator compressor, check valve and an oil pump are all contained in the sealed dome of the unit. The motor is refrigerant cooled as shown in Fig. 2. The refrigerant vapor is compressed by the Rollator and passed into the upper part of the

Table I.—Norge Refrigerant and Oil Data.

Year	Model No.	Refrigerant Used	Refrigerant Amount	Oil Oz.	Motor Size	Refrigerant Control	Belt Size
	T-20B	SO	4 lbs. 8 oz.	32	⅛	LSF	35¼ x ⅝
	S-310	SO	5 lbs. 4 oz.	32–33	⅛	LSF	35¼ x ⅝
	E-310	SO	5 lbs. 4 oz.	32–33	⅛	LSF	35¼ x ⅝
	E-425	SO	5 lbs. 4 oz.	32	⅛	LSF	35¼ x ⅝
	E-425A	SO	5 lbs. 4 oz.	32–33	⅛	LSF	35¼ x ⅝
	L-425	SO	5 lbs. 4 oz.	32–33	⅛	LSF	35¼ x ⅝
	P-425	SO	5 lbs. 4 oz.	32	⅛	LSF	35¼ x ⅝
	E-625	SO	5 lbs. 4 oz.	32–33	⅛	LSF	33 13/16 x ⅝
	E-625A	SO	5 lbs. 8 oz.	32	⅛	LSF	.....
	L-519	SO	5 lbs. 4 oz.	32	⅛	LSF	35¼ x ⅝
1935	P-519	SO	5 lbs. 4 oz.	32	⅛	LSF	35¼ x ⅝
	L-621	SO	5 lbs. 8 oz.	32	⅛	LSF	33 13/16 x ⅝
	P-621	SO	5 lbs. 8 oz.	32	⅛	LSF	33 13/16 x ⅝
	L-720	SO	5 lbs. 12 oz.	32	⅛	LSF	33 13/16 x ⅝
	P-720	SO	5 lbs. 12 oz.	32	⅛	LSF	33¼ x ⅝
	L-804	SO	6 lbs.	32	¼	LSF	36 x ⅝
	P-804	SO	6 lbs.	32	¼	LSF	36 x ⅝
	P-953	SO	6 lbs.	32	¼	LSF	34 x ⅝
	P-1117	SO	10 lbs.	32	¼	LSF	34 x ⅝
	S-31-6	SO	5 lbs. 4 oz.	32–33	⅛	LSF	35¼ x ⅝
	E-32-6	SO	5 lbs. 4 oz.	32–33	⅛	LSF	35¼ x ⅝
	E-42-6	SO	5 lbs. 4 oz.	32–33	⅛	LSF	35¼ x ⅝
	E-52-6	SO	5 lbs. 8 oz.	32–33	⅛	LSF	35¼ x ⅝
	E-62-6	SO	5 lbs. 8 oz.	32–33	⅛	LSF	33¼ x ⅝
	E-62-6B	SO	5 lbs. 8 oz.	32–33	⅛	LSF	.....
	L-42-6	SO	5 lbs. 4 oz.	32–33	⅛	LSF	35¼ x ⅝
	P-42-6	SO	5 lbs. 4 oz.	32–33	⅛	LSF	35¼ x ⅝
	L-52-6	SO	5 lbs. 8 oz.	32–33	⅛	LSF	35¼ x ⅝
	P-52-6	SO	5 lbs. 8 oz.	32–33	⅛	LSF	35¼ x ⅝
1936	L-62-6	SO	5 lbs. 8 oz.	32–33	⅛	LSF	33¼ x ⅝
	P-62-6	SO	5 lbs. 8 oz.	32–33	⅛	LSF	33¼ x ⅝
	L-72-6	SO	5 lbs. 12 oz.	32–33	⅛	LSF	33¼ x ⅝
	P-72-6	SO	5 lbs. 12 oz.	32–33	⅛	LSF	33¼ x ⅝
	L-82-6	SO	6 lbs.	32–33	¼	LSF	36 x ⅝
	P-82-6	SO	6 lbs.	32–33	¼	LSF	36 x ⅝
	P-95-6	SO	6 lbs.	32–33	¼	LSF	34 x ⅝
	P-112-6	SO	10 lbs.	34–36	¼	LSF	34 x ⅝
	LTL-62-6	SO	6 lbs.	32–33	..	LSF	.....
	LTP-62-6	SO	6 lbs.	32–33	..	LSF	.....
	GL-75-6	SO	5 lbs.	32–33	..	LSF	.....
	LTP-82-6	SO	6 lbs.	32–33	..	LSF	.....
	S-31-37	SO	5 lbs.	26–27	..	LSF	35¼ x ⅝
	S-32-37	SO	5 lbs.	26–27	..	LSF	35¼ x ⅝
	S-42-37	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	S-52-37	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	S-62-37	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	S-72-37	SO	5 lbs. 12 oz.	26–27	..	LSF	33¼ x ⅝
	P-42-37	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
1937	N-52-37	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	P-52-37	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	N-61-37	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	P-61-37	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	N-72-37	SO	5 lbs. 12 oz.	26–27	..	LSF	33¼ x ⅝
	P-72-37	SO	5 lbs. 12 oz.	26–27	..	LSF	33¼ x ⅝
	N-81-37	SO	5 lbs. 12 oz.	26–27	..	LSF	36 x ⅝
	P-81-37	SO	5 lbs. 12 oz.	26–27	..	LSF	36 x ⅝
	LTP-81-37	SO	6 lbs.	26–27	..	LSF	36 x ⅝
	LTP-122-37	SO	10 lbs.	28–29	..	LSF	36 x ⅝
	GN-75-37	SO	5 lbs.	26–27	..	LSF	33¼ x ⅝
	R-32-8	SO	5 lbs.	26–27	..	LSF	35¼ x ⅝
	R-41-8	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	S-52-8	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	S-62-8	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	S-71-8	SO	5 lbs. 12 oz.	26–27	..	LSF	33¼ x ⅝
	S-71-8A	SO	5 lbs. 12 oz.	26–27	..	LSF	33¼ x ⅝
	R-42-8	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	P-42-8	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
1938	R-51-8	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	P-51-8	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	R-61-8	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	P-61-8	SO	5 lbs. 4 oz.	26–27	..	LSF	35¼ x ⅝
	R-71-8	SO	5 lbs. 12 oz.	26–27	..	LSF	33¼ x ⅝
	P-71-8	SO	5 lbs. 12 oz.	26–27	..	LSF	33¼ x ⅝
	R-81-8	SO	5 lbs. 12 oz.	26–27	..	LSF	36 x ⅝
	P-81-8	SO	5 lbs. 12 oz.	26–27	..	LSF	36 x ⅝
	LTP-81-8	SO	6 lbs.	26–27	..	LSF	36 x ⅝
	LTP-123-8	SO	10 lbs.	32–33	..	LSF	36 x ⅝
	GR-75-8	SO	5 lbs.	26–27	..	LSF	33¼ x ⅝
	R-130-8	SO	10 lbs.	32–33	..	LSF	34⅛ x ⅝
	M5	SO	30 oz.	16–18	⅛	HSF	33 3/16 x ⅝
	M6	SO	31 oz.	16–18	⅛	HSF	33 3/16 x ⅝
1939*	M8	SO	34 oz.	16–18	¼	HSF	33 3/16 x ⅝
	S5	SO—34 oz. & F12—2 oz.		16–18	⅛	HSF	33 3/16 x ⅝
	S6	SO—36 oz. & F12—2 oz.		16–18	⅛	HSF	33 3/16 x ⅝
	S8	SO—38 oz. & F12—2 oz.		16–18	⅛	HSF	34 x ⅝

* Hermetic models not included. No data available.

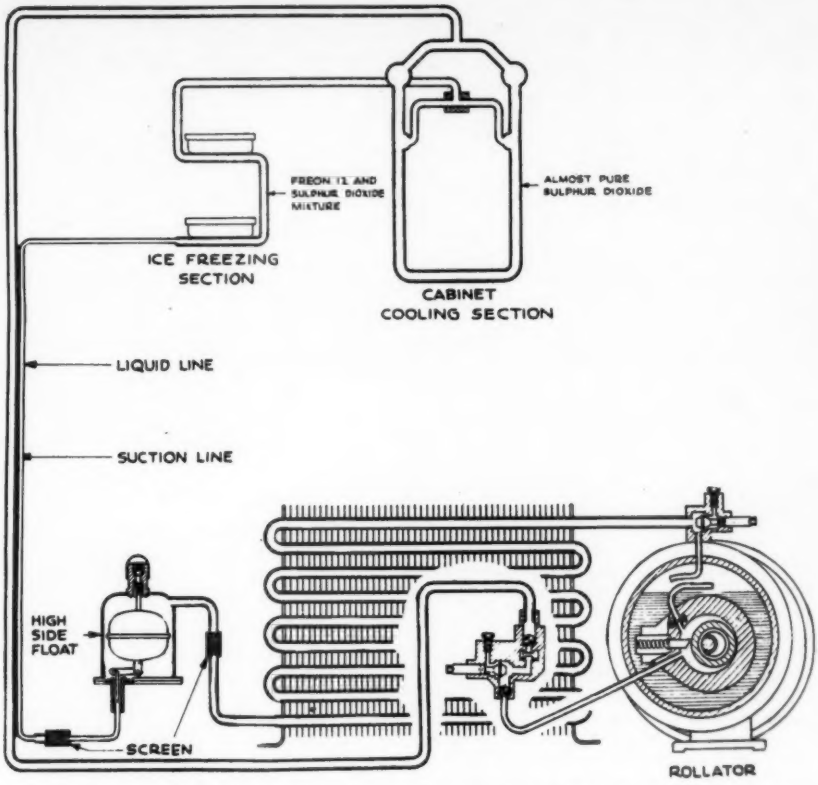


Fig. 1—Diagram of the Norge C/M Synchronizer employing a mixture of Freon 12 and sulphur dioxide

condenser where it condenses to a high pressure liquid. This liquid is then carried back to a jacket surrounding the motor windings in the sealed dome where it absorbs heat. It is again vaporized and returned to the lower part of the condenser to be cooled and condensed to a liquid. The high side float valve meters refrigerant to the evaporator.

A certain amount of oil circulates with the refrigerant following the same path as the refrigerant. Proper lubrication of the motor and compressor parts, however, are assured by forced lubrication, provided by an oil impeller attached to the lower end of the eccentric shaft and immersed in the oil reservoir. The impeller forces oil up through an oil discharge tube into the refrigerant discharge chamber. Oil passages lead from this chamber back to the shaft and other moving parts. Fig. 3 shows a view of the sealed unit and the path of oil circulation.

Field Service Operations

In accordance with the manufacturer's instructions no attempt should be made to perform any service operations whereby the sealed-in system is opened. To guard against this all openings or caps covering openings in the system are sealed at the factory. Where these seals have been broken, complete reconditioning charges will be made at the factory. The following information, therefore, covers only those service operations which can be performed in the field.

Complaints of no refrigeration, poor refrigeration or erratic operation are seldom due to internal defects in the sealed system but are usually traced to some improper con-

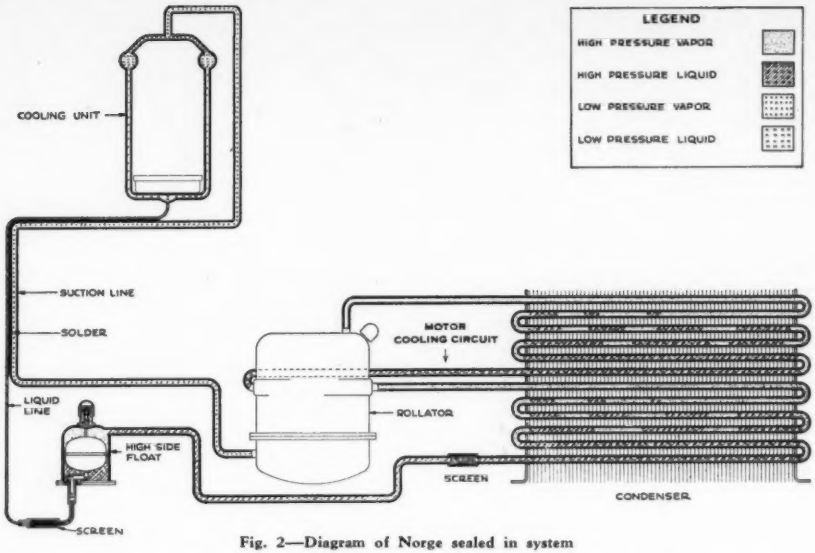


Fig. 2—Diagram of Norge sealed in system

dition in one of the four serviceable parts. Each part should be carefully checked to insure against the loss of time and expense incurred when a system is changed unnecessarily.

The system is charged with sufficient refrigerant to normally reach a level in the cooling unit, midway on the emboss near the top. The refrigerant level may vary slightly, being either higher or lower, depending upon the load imposed and the ambient temperature conditions.

Symptoms of Low Refrigerant

Long running time, high cabinet temperatures and abnormally low frost line on the cooling unit are indications of a shortage of refrigerant, usually due to a leak in the system.

A characteristic of the sealed-in models is a partial defrosting of the cooling unit during the off cycle. The upper part of the cooling unit may become entirely bald. This defrosting is *not* to be confused with a shortage of refrigerant.

Indications of a shortage of refrigerant can also be caused by the cold control being out of adjustment. A high cut-in point of the control will cause an abnormally low frost line. In any case, the control should be thoroughly checked for correct adjustment.

Refrigeration Characteristics When Unit Is First Started

When first starting system, especially after long storage in lower temperatures, the refrigerant will be condensed in the sealed dome. After the dome becomes warm, the refrigerant will return to the cooling unit and assume a normal balance. The customer should be informed that the cooling unit may not become frosted for several hours when first started.

Improper Ventilation

If sufficient cool air is not passing through the condenser to carry away the heat absorbed, poor refrigeration will result and the unit may become overloaded, causing the motor to stop.

If the complaint is caused by improper ventilation, this can be remedied by removing any restriction interfering with proper circulation or placing the refrigerator in a location where ample ventilation is assured.

Testing Cold Control Settings

Since there is a definite relation between the settings of the cold control and the temperature of the cooling unit sleeve, it is possible to check these settings by referring to

Improper Conditions	May Cause	Correction
Cold Control has dead power element. Remove cold control bulb from bulb clamp and warm bulb with hands. Turn control to "Off" position. If a distinct click is not heard, control power element has lost its charge.	(a) Unit won't start.	Change control.
Improperly adjusted cold control	(a) Continuous running or erratic cycle if cut-out point is too low. (b) Poor refrigeration or high cabinet temperatures if cut-in point is too high.	Readjust or change control.
Improper ventilation.	(a) Poor refrigeration. (b) High cabinet temperatures. (c) Slow ice freezing. (d) Long running time. (e) Unit won't start, due to excessive load on motor causing overload device to operate and break circuit.	Remove any restriction interfering with proper circulation. Be certain no articles or paper have fallen into flue. Be certain refrigerator is located where ample ventilation is assured.
Low refrigerant level on cooling unit.	(a) High cabinet temperatures. (b) Long running time.	Change system.
Suction line frost back.	(a) Erratic operation.	Change system.
Noise—Noise complaints are usually caused by tubing rattle or other external conditions which can easily be remedied. The operating sound level of the sealed unit may vary and should the complaint originate from this source, every effort should be made to prevent the unit being changed unnecessarily.	(a) Noise.	Change system only if noise is internal and impossible to remedy to satisfaction of customer.

the average sleeve temperatures shown in Table 2.

Clamp a thermometer in place on the sleeve and check the temperature of the sleeve when the system stops and starts. If the difference between cut-in and cut-out sleeve temperatures is approximately 6 to 8 degrees, the differential setting of the control is correct and the control range may be adjusted as explained under "Adjusting Cold Controls."

If this difference is much greater or less than 6 to 8 degrees the control differential is out of adjustment and the control should be replaced.

These figures are approximate and are taken with no trays in cooling unit and thermometer in sleeve bottom.

A short differential in control setting will cause short cycling of the unit. A long differential in control settings will result in a long operating cycle.

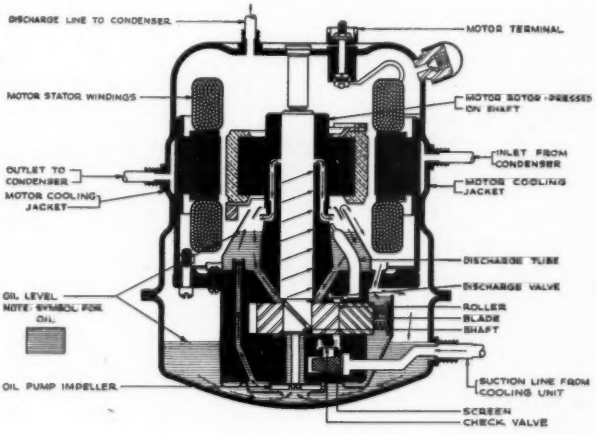


Fig. 3—Oil circulation in the Rollator

Adjusting Cold Controls

The temperature range may be raised by turning the dial knob to a higher number. The total adjustment of the temperature range, by moving the dial knob the full length of the dial, is approximately 10 degrees.

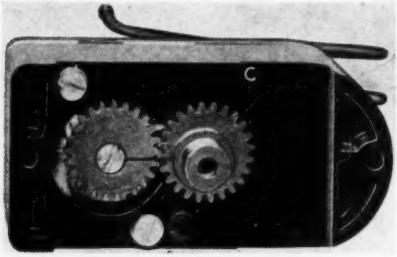


Fig. 4—Adjusting gears of cold control

No changes in temperature settings should be required for elevations up to 8000 feet. It may be necessary to change the settings approximately one degee for each additional 1000 feet of elevation. This change should be made by resetting control one degree F. warmer.

Changing the position of the dial knob does not change the differential adjustment between the cut-in and cut-out points. The differential is set at the factory and is not to be tampered with in the field. When it becomes necessary to change the temperature range beyond the limit of the knob movement, a further adjustment may be made as follows:

Pull dial knob straight off control shaft. Remove two screws from dial plate and control can be lifted off from plate exposing adjusting gears.

Each gear is inscribed with a moulded hairline. When the hairlines are in direct alignment, the gears are properly meshed. The gears are eccentric and must be properly meshed or they will bind.

Also note that the case is inscribed with a moulded hairline. The hairline on the case indicates No. 1 position as corresponding to No. 1 position printed on the dial plate.

To lower the temperature range, reinstall knob and rotate to No. 9 position—all the way to the left. Loosen screw in bellows gear. Turn dial knob to No. 5 position (pointing straight up) and retighten screw very securely in bellows gear. When knob is now turned to No. 9 position, the temperature range will be lowered approximately five degrees.

To raise the temperature range, turn the dial knob to No. 1 position and proceed exactly as described before.

Cold Control Will Not Cut Out

The cold control will not cut out if the temperature range is set below the capacity of the refrigerating system. This condition may also be caused by the system not operating properly, to the extent that the cooling unit temperature cannot be lowered to the point of cut-out adjustment of the cold control.

Short circuits in the cold control cord will also prevent the motor from being stopped by the operation of the cold control, and continuous operation of the motor will result.

Table 2—Norge Cold Control Data

Control Part No.	Year Used	Bulb Temperature Settings Cut-In	Bulb Temperature Settings Cut-Out	Average Sleeve Temperature Cut-In	Average Sleeve Temperature Cut-Out
RH-1600	1939—8 cu. ft. models only	25° to 27°	9.5° to 11.5°	26° to 27°	20° to 22°
RH-1602	1939—All models except 8 cu. ft.	26° to 28°	13° to 15°	26° to 27°	20° to 22°
RH-2889	1940—All models	26° to 28°	11° to 13°	23° to 25°	18° to 20°

All data with control in No. 1 position

Cold Control Will Not Cut in

The cold control will not cut in when the dial knob is on the "Off" position.

The cold control will not cut in when the bellows has lost its charge. To test control for lost bellows charge, remove tube from clamp and warm it with your hands to insure switch cutting in, then turn dial knob to "Off" position.

If bellows is properly charged, the switch will offer considerable resistance when the off position is reached and a distinct click will be heard.

If the charge is lost, the dial knob can be turned to the off position without resistance by the switch and no click will be heard.

Cut-in of the cold control will not start the motor if there is an open circuit in the wiring.

(To be continued)

A complete description of the electrical system, including wiring diagrams, will be contained in the November issue.

Are you a judge of good beer? Does the appearance and taste of a glass of beer help you diagnose the effectiveness of the equipment used in—

Serving Good Beer

Many of us are inclined to blame the beer when it is wild or flat, and when it tastes bitter or sharp. But why blame the brewer when the dispensing equipment is more often at fault?

By KENNETH SHEA

DRAFT beer is an unpasteurized cereal beverage made from malt syrup and water which has been put through a process of fermentation. It provides its own carbonation naturally during the fermentation process, whereas other beverages, such as ginger ale, are artificially carbonated by means of a carbonator.

The process of making beer begins with the cleaning and grading of the barley, which is then steeped in water, stored in large drums and allowed to sprout, forming what is called "green malt". It is then thoroughly kiln-dried so that the malt may be safely stored.

As needed the malt is sent to the brewhouse, where it is ground and placed in a mashing tank with water at 100 degrees F. After this phase of the brewing is complete, a liquid called "wort" is drawn off and placed in large copper kettles; hops are added, and the mixture is boiled for about three hours. Next, the hops are strained out, and the wort is cooled, ready for fermentation.

In the fermenting cellars, yeast is added to the wort, and the mixture is allowed to ferment for a period of three or four weeks at a temperature of 45 degrees F. This is perhaps the most important part of the entire brewing process. A brew master, like any manufacturer, strives for uniformity, and during this period the temperature maintained will govern the entire character of the beer. The temperature must be uniform at all times to produce any desired characteristic.

After fermentation, the beer is drawn off into lagering vats, where constant pressures are maintained to prevent the carbonic gas, formed during the fermenting period, from escaping out of the beer. Fermentation is completed in about three months, after which the beer is drawn off, filtered, and barrelled, then stored under temperatures of about 32 degrees F.

Bottled beer goes through the same process outlined for draft beer, but instead of being barrelled, it is bottled, then pasteurized by heating the bottles to about 160 degrees F. This is the only difference between the two beers, and is the reason why bottled beer may be kept in an unrefrigerated space for any length of time, while draft beer must be stored under refrigeration at all times or it will spoil.

We have little to do with the brewing process of beer, however, and because bottled beer presents few handling difficulties, we will confine the rest of our article to the dispensing problems of draft beer.

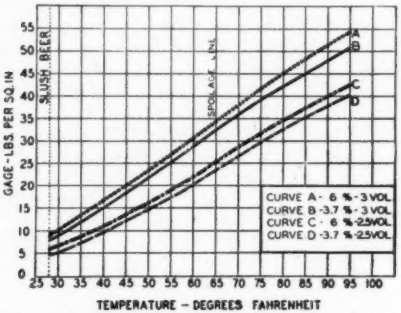
The dispensing of draft beer is not only a problem of cooling to the desired temperature, but is a combined problem of cooling and control of the carbonic content. The beer must always be cooled, of course, preferably to a temperature of 40 degrees F. and this temperature must be maintained regardless of the original temperature of the beer, the rate at which it is being drawn, or the room temperature. The refrigeration equipment, therefore, will have to be sized for the maximum conditions.

Equally important, however, is the appearance of each glass drawn. It must have eye appeal. For example, the collar must not be too much so that the customer thinks he is getting mostly foam, but at the same time, the collar must not be too small so that the beer appears flat. It is true that a small collar does not always indicate flat beer, but our public has been educated to

the idea of a certain sized collar, and any change is likely to create sales resistance for the bartender.

The beer must also have the same good taste, or quality it originally possessed. The refrigeration and dispensing equipment cannot improve on this taste or quality, but it can rapidly spoil it if the equipment is poorly designed.

The foam-head appearing on the top of a glass of beer, ginger ale, or other soft drinks, is due to the release of carbonic gas from the drink. When a liquid and gas are mixed together under constant pressures and temperatures, the liquid becomes saturated with a certain amount of gas. When the pressure is released, the liquid becomes supersaturated, and the entrained gas "boils off", producing what is generally called effervescence. The character of beer, its palatability, its refreshing qualities, depends not only upon the amount of carbonic gas dissolved, but also upon the character of the carbonation itself, and by the gas-retaining qualities of the beer.


GAGE - LBS PER SQ. IN
TEMPERATURE - DEGREES FAHRENHEIT
SLUSH BEER
ISOBARIC LINE
A
B
C
D
CURVE A - 6 % - 3 VOL
CURVE B - 3.7 % - 3 VOL
CURVE C - 6 % - 2.5 VOL
CURVE D - 3.7 % - 2.5 VOL
Fig. 1—Pressure required to keep CO_2 in solution

Carbon dioxide is a natural by-product of the brewery, and a certain amount of this gas is dissolved by the beer during the fermentation process, producing partial carbonation. Some beers obtain the balance of their necessary carbonation under pressure during after-fermentation, while others are artificially carbonated with compressed fermentation gas or commercial drum gas. A rest period is provided after saturation to stabilize the product. In this way the liquid becomes not only fully saturated with a definite amount of gas, but the gas is thoroughly bound.

There is a definite difference between loosely bound and closely bound carbonation, evidenced by the gas-retaining character of the product. A correctly carbonated beer liberates its gas in minute bubbles which slowly form a perfect foam head after the normal agitation of serving.

The principal factors governing the character of carbonization, or the amount of gas held in solution, are as follows:

1. The lower the temperature of the beer and carbonic gas, the more gas will be absorbed and held in solution.

2. The higher the pressure maintained in the carbonating vessel, the more carbonic gas will be absorbed and held in solution.

3. A minimum time period must be allowed to intermingle the gas with the liquid, in order to complete the absorption process or reach a point of full saturation at the temperature and pressure maintained.

4. After saturation has been reached, a rest period is desirable to stabilize or quiet the carbonization, thus increasing the gas-retaining qualities of the beer.

5. Oil and grease should be guarded against, because they interfere with carbonization and destroy foam head.

6. Due consideration should be given to the mechanical properties of beer or carbonated liquids while handling or transferring. Pressure reductions or agitation caused by high velocities or sudden reductions in lines and passages should be reduced to a minimum.

Carbonization Required

Generally speaking, it is agreed that if beer contains less than .35 per cent of carbonic gas by weight in the keg, and less than .3 per cent in the drinking glass, it will show insufficient life and will taste flat. On the other hand, too high a carbonation will cause rapid evolution of the gas and a quicker collapse of the foam head. The carbonation of beer must, therefore, be controlled within rather close limits. The customary carbonation in kegs is between .35 per cent and .4 per cent, while in bottled beer, between .37 per cent and .42 per cent.

The Russ Laboratories have conducted a large number of experiments to determine the exact relation between the pressure of CO_2, the temperature of the beer, and the amount of CO_2 which can be forced into solution in beer. This relation is shown in Fig. 1 and in Table 1.

As stated before, carbonated liquids kept under pressure, such as an unopened bottle of beer, will begin to lose their carbonation when the pressure is reduced because they become super-saturated. When the pres-

sure reduction is gradual, the result is known as effervescence, but when the reduction is accompanied by agitation, the gas loss is much more sudden, producing what is known as foaming. To better understand these reactions, the following examples are offered.

When a bottle of beer is opened slowly without agitating the bottle, there will be only a slight foam head caused by the released gas, even though the beer is supersaturated. Shake the bottle violently first, however, and remove the cap quickly, the beer will boil over. This shows that the combined pressure reduction and agitation will cause the gas to be released much more rapidly.

If the shaken-up bottle is put back in cold storage for a period of four or five hours, then opened gently, no difference in foaming will be noticed over the first bottle. Likewise, if one of two bottles opened is cooled to serving temperature, while the other is warm, it will be noted that the warm bottle will foam excessively.

If the cap of a highly charged bottle of ginger ale is removed gently, releasing the pressure slowly, the effervescence will be hardly noticeable. If you pour out half this bottle into a glass slowly and without agitation by tilting the glass, thus allowing the ginger ale to run down the side of the glass, this portion of the bottle will have a fine flavor and good carbonation. Shake the remaining half of the bottle and pour it into another glass. After the foaming has subsided, compare its taste with that of the first glass and note how much of its "taste-appeal" has been lost.

Conclusions

From these examples, certain conclusions can be reached:

1. Agitation, pressure reduction, and rise in temperature combined cause the heaviest loss of carbonation with the most violent foaming.

2. The stability of carbonation of a liquid, when agitated under pressure, will be unbalanced for quite some time, even though it be kept under counter-pressure.

These conclusions then bring forth these recommendations:

1. That after any undue agitation, such as during delivery, the beer be permitted a rest period to regain stabilization.

2. That beer be transferred through beer lines, coolers, valves, and so forth, with as little agitation as possible and at a reasonably slow velocity and constancy of pressure.

The answer to the problem of whether air pressure or gas pressure should be used in beer dispensing equipment can be found in the following discussion.

The comparative total cost, including the initial cost and operating cost over a period of one year, will be about the same, or slightly in favor of air pressure for the average installation. This comparison may overbalance in favor of gas where the installation, or amount of beer served per day, becomes less than average, or in favor of air when the installation increases.

The greatest consideration, however, is in effect on the beer. It is naturally the aim to serve the customer a glass of beer having a rich creamy collar, in which there has been

TABLE 1.—PRESSURE REQUIRED TO KEEP CO_2 GAS IN SOLUTION IN VARIOUS BEERS

Beer Temperature °F.	Gage Pressure Lbs. Per Sq. In. Beer of 6% Alcohol Gas Content in Volumes 2.5	3.0	Beer of 3.75% Alcohol Gas Content in Volumes 2.5	3.0
35	9.0	13.5	7.5	12.0
40	11.0	17.0	10.0	15.0
45	14.0	20.0	12.0	18.0
50	16.5	23.5	15.0	21.5
55	19.0	27.0	17.5	25.0
60	22.0	30.5	20.5	28.5
65	25.0	34.0	23.0	32.0
70	28.0	38.0	26.5	35.0
75	31.5	41.5	30.0	39.0
80	34.5	45.0	33.0	42.0
85	37.0	48.0	35.5	45.0
90	40 0	51.0	38.0	48.0
95	42.5	54.0	41.0	50.5

Note: Gas content is expressed at atmospheric pressure and 32°F. Add 0.5 lb. for each foot the beer is to be elevated.

retained nothing but the original malt-flavored, dissolved CO^2 gas of fermentation contained in the keg at the time of delivery.

Beer with the right amount of carbonation has life and a definite taste, but if this quantity of CO_2 is increased, the beer will develop a sharp biting tang, extremely unpleasant to the taste. Depending upon the temperature to which the beer is precooled, the length of time it is held under pressure, and the pressure maintained on it, varying amounts of the CO_2 will be dissolved into the beer. Therefore, CO_2 as a means of pressure is undesirable, because it may overload the beer with carbonic gas to such an extent that the slightest agitation while filling the glass will liberate all of the excess gas and produce far more foam than desired. The beer is then called "wild."

As it requires five or six hours, however, for the CO_2 to go into solution, gas can be used for short periods as emergency pres-

sure, or where the beer will all be served within that length of time.

Beer Temperatures

If beer is kept at room temperatures, it will spoil quite rapidly and develop an "off-taste." The higher the temperature, the more rapidly it will spoil. For this reason, draft beer must always be kept at temperatures below 65 degrees F. For the sake of economy it should be kept at less than 55 degrees F. because this is the temperature at which it is delivered, and it is poor economy to allow it to warm up above this temperature, then have to cool it again before serving.

At 28 degrees F. water crystals begin to freeze out of beer, and it will gradually slush until, depending on the alcoholic content, it reaches 22 degrees F., when beer freezes. Some beers of low alcoholic content, freeze at temperatures as high as 29 degrees F. The serving temperature of beer is usually 40 degrees F., and in order to be palatable should never be less than 38 degrees F.

Measuring Non-Condensables

By DONALD DELAYEN

MORE and more as time goes along service engineers are employing scientific methods in the servicing of refrigerating machines, methods which eliminate the guess work from service work and provide definite indications of the effectiveness of an operation.

When a system is found to have a high head pressure and is suspected of having non-condensables in it, the first thing that is usually done is to purge the top of the condenser or float valve. Purging will reduce the head pressure for a short time, irrespective of whether or not there were non-condensables present. If the high head pressure is due to other causes, however, the pressure will be back to its original reading within a short time.

It is often desirable, particularly on hermetic units, to determine definitely whether, and to how great an extent, non-condensables are present. The purging of hermetics is often done without any knowledge of whether it was necessary or whether any good had been accomplished. Time alone will tell in the cases where it was necessary, but time is not cheap.

The device illustrated in Fig. 1, and described in the following, is intended for the measurement of non-condensable gases in refrigerants by what is known as the "Water Sampling Method."

The equipment can be purchased on the market for about $15.00, but a very satisfactory sampler can be constructed much more cheaply from materials immediately available. It consists chiefly of three bottles (1, 2, and 3 in Fig. 1). One of these, number 3, must be calibrated in cc. (cubic centimeters) as shown. It is these bottles which represent the greater part of the cost when purchasing the equipment on the market.

Bottles 1 and 3 should be anywhere from a pint to a quart size, depending on how large you wish to make the equipment. Both must be the same size and height. Clear glass ginger ale bottles will do very well. Bottle 2 must be considerably shorter in height and must be capable of holding twice as much as bottle 1 or bottle 3. In other words, if bottles 1 and 3 are pint size, bottle 2 should be quart size. The large ginger ale bottles which hold approximately one quart for bottles 1 and 3, and a one-half gallon bottle for number 2 will be better for commercial work.

To graduate bottle 3, fill it with water and start measuring out 10 cc. of water at a time, marking the water level after each measurement on a piece of paper glued to the side. A cc. graduate can be secured for this purpose. The connection at the top of bottle 3 should have a funnel-shaped spreader or sprayer inserted in it to spray the water down into the bottle. Holes for connections at the bottom of each bottle can be drilled by almost any local glass company at very little expense.

The connection to bottle 3 should be a tubular glass tee. All other connections are of soft acid-resisting rubber tubing. The two clamps shown at A and B are of the type that are normally closed and require pressure of the hand to open them.

To protect the equipment and make it portable, it should be enclosed in a wooden case.

Using the Equipment

Although this method is known as the "Water Sampling Method," liquids other than water are sometimes used. For sulphur dioxide, methyl chloride, and methyl formate, water can be used. For Freon 12, however, carbona, trichlorethylene, or kerosene should be used.

Before a test is made on the system, the machine should be idle for at least 15 minutes to permit the condenser to cool and the vapor to condense. Cooling the condenser by any artificial means will aid in securing a sample with the least amount of refrigerant in it.

Making the Test

Bottles 1 and 3 are filled with water by filling bottle 2, unclamping A, then raising bottle 2. The water will then run by gravity from 2 to 3 and then to 1. Clamp the hose at A and replace bottle 2 as soon as 1 and 3 are full. Bottle 2 should have enough water left in it to cover the bottom connection, thus preventing air from entering at that point.

The rubber tube leading from the tester should be connected to the discharge valve of the compressor, the purging valve of the highside float, or the charging port of the hermetic unit. Unclamp B and permit gas from the unit to bleed very slowly into bottle 3. This bleeding must be very slow so that only non-condensables are taken for the sample, and it should continue until a 300 or 400 cc. sample is secured in bottle 3. Water will be forced by the gas from bottle 3 into bottle 2. Close the purging valve and clamp the hose at B very carefully after the sample is taken. In order that a true measurement of the sample taken can be secured, bottle 2 should be raised or lowered so that the water levels in bottles 2 and 3 are the same, thus insuring the maintenance of atmospheric pressure while the reading is taken.

Next, lower bottle 2 below bottle 3 and unclamp A. This will permit the water to flow by gravity from bottle 1 and spray down through the sample in bottle 3 into bottle 2. The water will absorb the refrigerant, permitting the water level to rise in bottle 3 until only non-condensables are left and the refrigerant has all been absorbed. Bottle 2 should be held in the lower position until the water stops rising in bottle 3; then the hose at A should be clamped firmly and bottle 2 raised until the level of water in it is the same as in bottle 3. A reading of the water level in bottle 3 will now tell you the cc. of non-condensables in the sample taken.

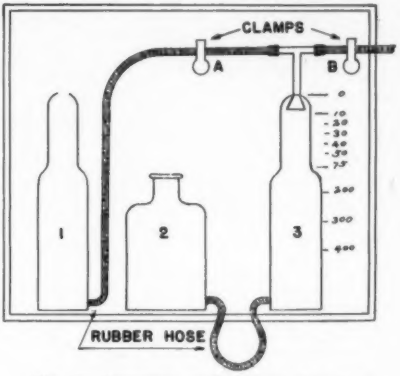


Fig. 1—Apparatus used in measuring non-condensables

The taking of samples and making of tests, as just described, should be continued until no non-condensables are found. The total cc. of non-condensable gas can then be added up from the results of each test. When there are no non-condensables in the sample, the water will absorb all of the sample and will rise to the top of bottle 3.

After a test has been completed, raise bottle 2 above bottle 3 and unclamp A, permitting the water to run back into bottle 1 until it is full. Clamp A again and replace bottle 2, and you are ready to take in another sample.

Change the water frequently because it will lose its absorbing power, as well as becoming acid and attacking the hose. For this reason, only a good grade of hose should be used.

S S S

Pat M. Kashiwabara,
Hawaii.

I think that THE REFRIGERATION SERVICE ENGINEER magazine is one of the best advisers any trouble shooter can have, and I appreciate it very much.

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment to "The Question Box."

CABINET OVERCOILED

QUESTION 455: We have just received a request to correct a job where there is a condition of excess moisture collecting on the meat in a walk-in cooler. This job has never been in proper condition since the day of installation. There have been several controls added, which they hoped would remedy this condition. These controls are humidity control and special temperature control. All efforts to date have been in vain, and the job is now over two years old. We are listing below the facts and would appreciate any information you may offer.

McCray walk-in cooler with Kelvinator forced-draft unit and Kelvinator condensing unit.

Size 6 feet x 6 feet x 7 feet 6 inches high.

Insulation assumed to be 3 inches of cork, or its equivalent.

Product load—very heavy.

Usage—heavy.

Glass—6 square feet triple glass.

Forced-draft unit—Kelvinator Model 48081, Serial 1580790.

Condensing unit—Model 16132, Serial 424870, ½-h.p. methyl.

Box temperature at present—32 to 36 degrees F.

Please note that they are maintaining a temperature of 32 to 36 degrees, which is fairly low. They say that if they try to keep it at a higher temperature, they cannot keep meat at all. They also stated that there are no native meats put in the box.

We believe that the above condition may be caused by an over-coiled job, but we will not do anything until we hear from you.

ANSWER: According to my calculations, the heat load on the McCray walk-in cooler will be in the neighborhood of 4,000 B.t.u. per hour. This is as far, however, as I can go in making an analysis of the job, since the model number you gave me for the forced draft unit turns out to be the model number of a condensing unit. Also, the model number you gave me for the condensing unit is apparently a part number, or for some other piece of equipment. I checked with Kelvinator on this matter, and they were unable to find any model number which would compare with those you gave me.

It does sound, however, as though your trouble is due to overcoiling of the job, and taking it for granted that this is the case, I might suggest that you try, as a first means of correction, blocking off about two or three rows of the coil near the bottom, so that air will not pass through the coil at this point. In other words, you might cut a piece of cardboard or sheet metal of a length that will cover the full width of the forced draft unit and of a height sufficient to cover two or three rows of the coil. It would be necessary to use two of these sheets, one to go in front of the coil, and one in the back.

By doing this, you will effectively cut down the usefulness of a part of the coil, and then it will become necessary to lower the pressure switch setting in order to obtain a lower refrigerant temperature in the coil.

Another thing that may help your situation is to install what is known as a synchro fan control. These controls are intended for the purpose of stopping and starting the fan every two or three minutes, so as to maintain air circulation in the box regardless of whether or not the condensing unit is running. Of course, if the coil is much too large for the job this synchro control may not entirely correct your trouble. The combined control, however, and blocking of a part of the coil should take care of it.

SLUDGE IN AMMONIA SYSTEM

QUESTION 456: I am working with a meat packing company, and recently at our branch plants we have installed small ammonia systems to take care of sales truck refrigeration.

We have a small York compressor installed by Westerlin and Campbell Company of Chicago. We have Kold-Hold units in the trucks, controlled by Alco thermostatic expansion valves. This is an entirely new system installed last fall.

We have had a lot of trouble with the expansion valves and the liquid hose plugging up. The suction hose and connections seem to be quite clean except for a small amount of pipe thread shavings and a little thick oil. The screens were clean except for a yellow dry deposit (very small amount which smelled like sulphur. The expansion valves were packed full of a dry deposit which, when

(Continued on page 36)

COMMERCIAL

INCREASE BUSINESS BY DOING A MORE EFFECTIVE JOB OF SELLING *Selling*

Building Up Contract Refrigeration Service

A prospect card file properly classified provides a live working list. A good follow-up system will do the rest.

By Robert Latimer

ASK ANY commercial refrigeration service operator what represents the most important factor of his business, and the most difficult to obtain. The answer is almost certain to be "development of contract business among my present accounts and the acquiring of new contract users." Many refrigeration service firms will agree with this, and can see the extreme advantages in "tying up" income for at least one year to come.

There are infinitely more possible opportunities for business than the average refrigeration service operator thinks— providing he "gets out and scouts" for such sales and service possibilities. His best selling field is the knowledge of all types of refrigeration users, knowing to the minute how much chance he has of selling him on contract service, and how they are disposed toward the idea. However, few such service firms can themselves expend the necessary time to "canvass" for such leads. This article outlines a plan followed by a prominent commercial refrigeration service firm of Kansas City, Missouri. For on its operating budget, this refrigeration service firm allows a generous amount for one purpose, that of bringing in a steady flow of "prospect information" on potential refrigeration service prospects which provide a workable basis for new-business promotion.

"The only logical method of compiling a good prospect list in this field" said the sales manager "is to dig it up yourself. Heresay information is unreliable, and that published in business reports can be used by your competitiors as well. Better business reports, building permits, and such tips are not closely fitted to the refrigeration service business, and others of the same type do not show the contract-sales possibilities in various areas.

"To offset this, my firm has devised a survey card which has provisions for explanatory data which shows to the penny how much business we can reasonably get from each refrigeration user of our city. After we made this card, we went through our service men's records, until we found the man who had qualifications for mis-

sionary work over the city. He can judge whether the possibility of securing contract business or service of other types exists at any point. We take this man off his service job one week of each month. He is then sent into every refrigeration possibility in the city, from week to week through the year, as sole judge as to whether the place is worth a prospect card. At each location, he talks to not only the owner, but the building engineer, janitors, clerks, salesmen and all people who are closely concerned with operation of refrigeration systems. From one of these, a lead is almost certain to develop—and his training plus special estimating ability enables him to size up any store accurately enough to get results. Verbal information is almost worthless, however, we consequently arrange for a systematic followup of file cards, both in direct mail and personal visits, which has opened up a tremendous amount of business."

Prospect Cards Classified

"This prospect card is a form used in a visible card file, and contains facts concerning each refrigeration point. It shows the operating necessities of the building, which may be a market, d a i r y, locker plant, air conditioning system, or simple counter refrigeration. It tells the type of business the store carries on, how many hours it operates, and approximately what its cost is. On each card we place a tab on the corner which shows its rating. 'LP' means a likely prospect, 'GP' an immediate prospect and a simple 'P' for unknown quantity. With this card index we have a rich line of information about the prospect and can accurately forecast the success we are likely to have when we call on him ourselves to suggest contract service to cover his refrigeration.

Example

"For example, we list a dealer in sea foods owning his property, and rated 'GP.' In four classifications are these bits of information: (1) deals entirely in highly perishable foods; (2) is interested in advance types of refrigeration; (3) has recently replaced his refrigeration compressor and coil work; (4) business is building up rapidly, will soon require a larger capacity system.

"The card lists personal facts, credit rating, and the man's personality. We see here that we have a good prospect both for sales of equipment, and possibly a contract system which guarantees him the condition of his sea foods. On such a prospect we call at once, and are likely to get business amounting to as much as $100 a year.

Having the Facts Saves Time

"When we do write, telephone, etc, we know our possibilities from the start, and talk nothing but the actual contract. Neither his time nor ours is wasted and this results in better relations. With 400 cards prepared in a year's time, this saving most of the preliminaries amounts to a substantial bit.

"Of course, we are not trying to compile a list of all refrigeration prospects in the city. This would require too long, and isn't the point we are trying to reach. Instead, we are merely supplied with complete information on as many prospects as we can hope to contact. We never fail to follow up those who look good for service, and to present each one with our flat-rate-per-month contract system.

By using this idea consistently, the Kansas City refrigeration firm has listed every prospect in any way likely to be interested in contract service, it has exact control over the equipment market which will be valuable for years to come. Around 60% of the list is worth while before the end of the first year—the remaining contract arrangement during the next eighteen months. Consequently a contract business has been built up in small orders which when totaled up show equally as profitable as large air conditioning or major refrigeration accounts. Total expense for the idea is simply the wages of one man for a week, plus a small amount for file cards and direct mail or personal followups. "Get out and sell" is more than a slogan with this Kansas City firm.

Daily Route Listings Make for More Speed

By Herbert Hanley

ONE of the most consistently bothersome problems of the metropolitan refrigeration service firm, is that of locating service mechanics quickly for some special reason. Servicemen performing a routine checkup job on an air conditioning plant or refrigeration system may be urgently needed suddenly when there is a breakdown or damage to another system—and unless the service firm has an adequate system of contacting its men in an emergency, a great deal of ill-will and actual loss of profits will result.

Allied Store Utilities Company, St. Louis refrigeration jobbers and service firm, has developed a simple solution to this problem with the use of a simple daily route list which 90% of the time is sufficient to keep every man in close contact with the office. Since the idea was introduced, the Allied firm has been unusually successful in getting men to super-markets, hotels, theatres, etc., in a few minutes to rectify any emergency refrigeration trouble deemed bad enough to warrant taking them temporarily off other work.

Like many refrigeration service firms who cover a wide metropolitan area made up of widely separated customers, the Allied Store Utilities Company found it difficult to contact its servicemen by telephone until slightly more than one year ago, when a new system of daily listings was developed. Prior to that time, the dispatcher in the service shop was forced to wait until the evening check-in to settle any problems which might have arisen. Inasmuch as there are continually breakdowns or stoppages which mean a loss of money to the customer, it becomes necessary that the service office be able to contact the serviceman as rapidly as possible. "We have noted several cases in which the company lost money and a good customer, through inability to get the service mechanic there within a half hour or so," it was pointed out. In some instances, this work was turned over to competitors simply to make certain that it was done hurry-up fashion. All of the firm's ten servicemen of course had instructions to telephone in whenever reaching a job—but because of busy lines, lack of telephone service, etc., this has never worked out satisfactorily.

To solve this problem, the firm in 1940 introduced a "serviceman's route list" which is a simple mimeographed form, bearing in ruled sections the average day's calls, twenty at maximum, with addresses and telephone numbers. A space at the top gives the serviceman's name, and the day on which the list is effective, with the date. They are made up in varied colors for the days of the week, such as green for Monday, blue for Tuesday, etc., which enables the office to keep a file of service work more readily available for later checkups and examination.

The first thing each morning, the ten servicemen are issued these route lists for the day, and asked to fill out in the correct order the calls assigned to them for the day. In some instances, the calls are penciled in by the dispatcher; in others, where men have "carryover" work from days past, the serviceman himself makes it out. All spaces are marked with approximately the time the serviceman anticipates he will call upon each. In this way, the listing for a typical Tuesday, for example, will show that serviceman Harvey Brown will be at the Hampton Super-Market at 11:00 o'clock, and that he will

go from there to a tavern at another location at 1:00 o'clock. All other calls are listed in the same way, with a bit of "leeway" for any unexpected service which will require longer time. In this way, the Allied firm can be reasonably sure that their serviceman can be located with 15 minutes of the time specified on the list, and that he will be able to substitute an emergency call without endangering service to any regular customer. "Spots" of several hours per week are deliberately worked into the route listings, to give sufficient extra time without throwing any of the standard calls out of alignment.

In this way, when an emergency arises such as motor burnouts, compressor failure, blower belt parting, etc., requiring quick service, any of the switchboard operators on the company's telephone lines can quickly locate the man who is closest to that location—often when he is only a few blocks away. In several cases during the past year, a quick scanning of the route listings when emergency calls came in revealed the presence of a serviceman as close as two blocks away—and comments from emergency customers pleased with the service have often formed the bond which results in later business with the same firm. Seldom is more than one telephone call required.

Use of this list has had several other good effects on the service staff, it was pointed out. First, the men have been required to lay out their sales routes to avoid waste of time and motion, and to arrange each call so it dovetails neatly into a pattern for the day. Use of this system has also formed the habit of making precisely-timed calls on a regular basis. This psychological advantage has worked out excellently, making the men take pride in being exactly where the list states they will be at the correct time. Of course there is no penalty attached in the event a serviceman runs into extra trouble on any job—but by accurately predetermining the amount of time required on all service calls, the firm has been able to form a network of long-range contacts which keeps emergency service available at all times.

Advertising the Service Business

By Lucius S. Flint

BECAUSE of the fact that refrigeration service is a commodity which is needed only occasionally, the service engineer is always up against a difficult advertising problem. The service he offers isn't an impulse commodity. It isn't the type of thing for which desire may be created by dramatization. Therefore, the exclusive service operator's problem is one of creating a permanent impression, of building confidence, of establishing a name and telephone number in the mind of the potential user in such a way that he'll remember it when the need for service arises.

Recognizing these facts, the Coldkraft Corporation, one of the leading exclusive service establishments of Los Angeles, has developed an unusual type of advertising program to meet these particular needs. The first phase of their campaign involves consistent shopping news advertising on the company's line of accessories and parts. Having created store traffic through this medium, Coldkraft makes a long-range bid for the service business of the people thus attracted by presenting them with refrigerator thermometers.

The present method is the outgrowth of considerable experimentation on various media. The company tried the usual type of display advertising in various publications. At one time, direct solicitors were used. During another period a direct mail campaign was adopted. Because of the nature of the business, none of them brought anything like the results achieved

under the present campaign. Direct mail would have been a good medium, the company believes, except for the fact that in a large city such as Los Angeles a great deal of rental property is handled by the agents and resident managers, with the result that it's almost impossible to compile the right type of mailing list. When using the usual commercial lists available, letters seldom reach the people who are in charge of purchasing.

To provide an attraction which would create floor traffic and make possible actual personal contact, the company decided to put in a line of merchandise which wasn't normally available either in the dealer establishment or in the exclusive service outlet. Investigation disclosed that accessories best met this requirement. Few places offered a complete assortment of such items as refrigerator hardware, trays and certain types of belts.

Advertise the Accessories

Having built up a good stock of this merchandise, the company switched all of its general advertising to this merchandise. The downtown shopping news in Los Angeles has a special advertising section devoted to service so the company decided to concentrate its expenditures here, using small-space insertions constantly.

At the same time, salesmen were instructed to get acquainted with all the large refrigeration dealers—particularly the department stores and exclusive electrical stores—and to explain to those outlets what was available here in the way of supplies. A tremendous amount of recommendation business was developed in this way in a very short time.

"Any wise refrigeration dealer wants his customers to be satisfied," Office Manager Jim Hamilton points out. "If he isn't able to supply that customer with hardware and other accessories he is in a better position to retain her good-will if he can tell her where to buy that merchandise. Since the average dealer isn't in competition with us on this score, he's perfectly willing to recommend us."

When an owner is brought in for accessories or parts—either by the shopping news advertising or by recommendation from the department stores—he's told about the company's complete refrigeration service and is presented with an accurate refrigerator thermometer—one he can hang right in the box. The company name and telephone number is printed on the paper inside the glass where it will never be accidentally defaced unless the thermometer is broken.

Costly but Useful

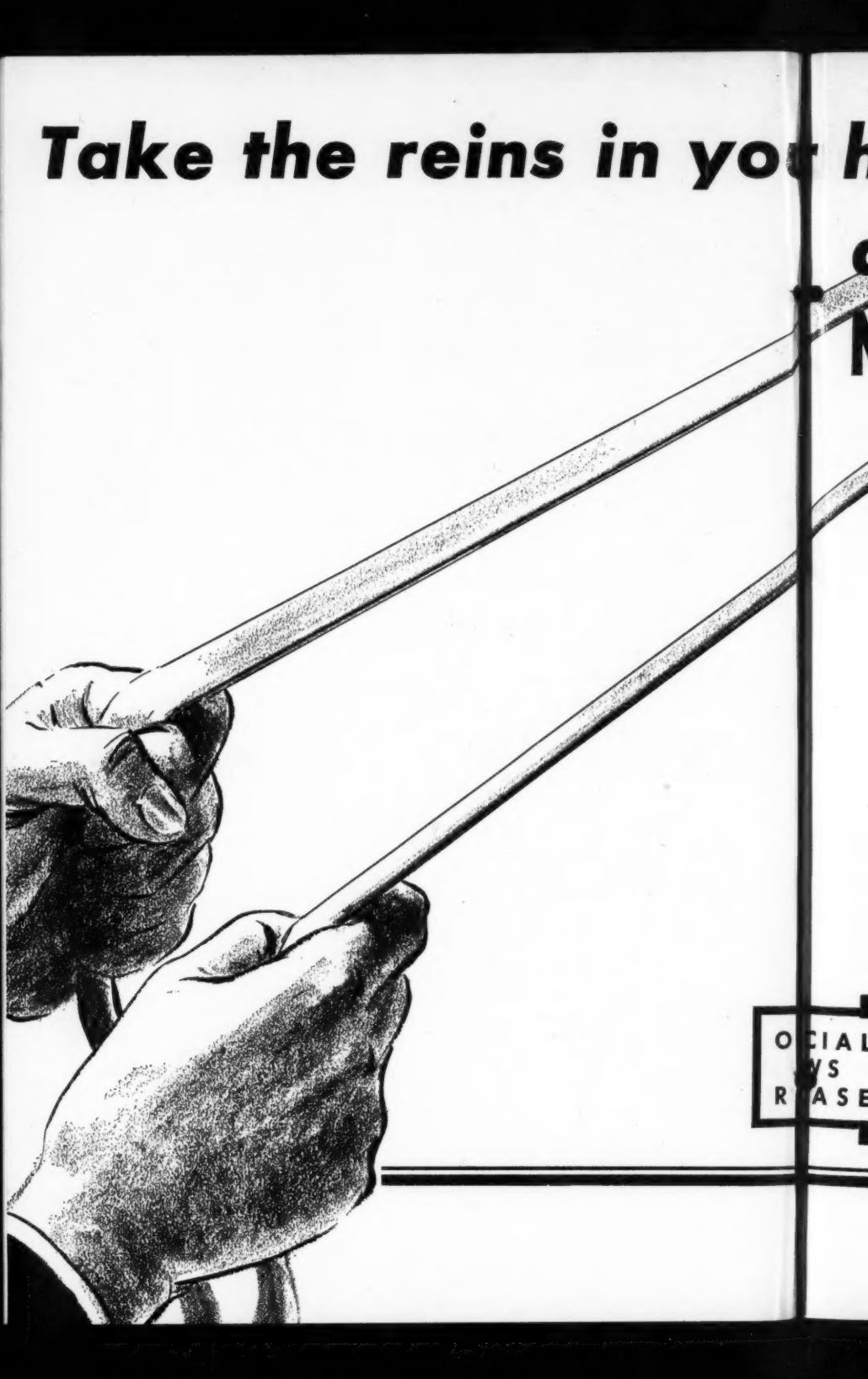
"This is a rather costly type of advertising but in a business such as ours I believe it's the best thing anyone can possibly use," says Mr. Hamilton. "Human beings are naturally lazy—we're all that way. When a person suddenly finds a need for refrigeration service, he wants to get it in the quickest, most convenient way. He'll seldom take the trouble to hunt up a mislaid business card or the receipt from the company which did his last service work. If there's nothing more convenient around to provide him with a service phone number, the chances are he'll look in the classified section of the telephone directory and pick off the first number he finds. The thermometer overcomes that tendency. When the owner discovers there's something wrong with the refrigerator, the thermometer is right there staring him in the face. It presents him with the quickest, easiest source of assistance and therefore he usually calls that number.

"Of course the method of distribution on this novelty advertising is important. If we were to go out soliciting house to house and distribute these thermometers, I don't believe we'd get anything like the percentage of returns that we do today. Despite the element of convenience, the customer wouldn't have the confidence in us that she does today. By distributing the thermometers only across our own counter, we make certain that they are placed in the hands of people who have met us, have seen our shop, know that we're reliable and are able to render efficient service."

In the last two years, the Los Angeles company has distributed some 1500 ther-

(Continued on page 34)

Take the reins in yo



...r hands and drive for TODAY'S NEW DEFENSE MARKET OPPORTUNITIES

NATIONAL DEFENSE demands that more perishable food must be preserved in this emergency. *Refrigeration must not fail.* Much service and installation work in this food preservation program is direct defense work. The government has given you priority tools—so hitch priorities to new defense installations as well as replacement parts.

O CIAL
VS
R ASE

WRITE FOR THIS IMPORTANT SALES TOOL

A new streamlined priority grant has been issued by Donald M. Nelson, Director of Priorities. Write to us for your copy of this important order which gives an A-10 rating to many phases of electric refrigeration.

FEDDERS MANUFACTURING CO., INC.

BUFFALO, N. Y.

Manufacturers of Electric Refrigeration Appliances for Commercial and Domestic Installations

mometers across its own counter—to people who have been brought in for accessories or parts. The cost on thermometers is about 15 cents each.

It's interesting to note that Coldkraft has now built up its accessories business to a point where it represents some 10 per cent of the total volume. That business carries the overhead—and what's more, it produces some of the most valuable traffic that could possibly be obtained.

Coldkraft has been in business only four years, now runs a crew of three full-time service men, with extras being added at peak seasons. The firm is headed by M. C. Cleveland as general manager.

Refrigeration Sales Far Ahead of Service Facilities in Rural Areas

By B. K. Anderson

Dealers, their store rooms full of out-of-order refrigerators complain about undeveloped service conditions. Traveling service firm is solution, this dealer believes.

"REFRIGERATION sales are vastly ahead of service in most rural areas!" A recent survey by THE REFRIGERATION SERVICE ENGINEER, found this sentiment voiced by practically every small town refrigeration firm contacted.

"What are the service conditions in your area?" We asked refrigeration firms of all sorts throughout the Ozark Mountain region, an area composed of portions of the states of Missouri, Kansas, Arkansas and Oklahoma.

"Service conditions are so bad in most places around here," they replied, "that often we lose a sale because our prospect's neighbor has a refrigerator that 'broke down' and hasn't been working for months. They're beginning to lose faith in refrigeration in some areas and something's got to be done about it!"

Certainly this condition is not true in blanket form. Many very excellent, fully equipped service firms spot the Ozark region. But it's true in enough of the area that, and we quote one of the dealers interviewed, *"There never was a greater opportunity for a new firm to build with an industry, than there is today for a refrigeration service firm to establish itself in the newly electrified regions of the Midwest!"*

Most of the dealers we talked to weren't sure what should or could be done about this shortage of refrigeration service in their area. In most cases they admitted that their single town and surrounding farms could hardly supply enough business to support a fully equipped and manned service firm. "I suppose we'll have to keep on sending the units into the City to be fixed, when the customer wants to pay that much," they said.

But Floyd Bartley, manager of the Mardick Appliance Company, Monett, Missouri, one of the dealers interviewed, was of a different opinion. He is convinced that a type of service, which is now being employed very successfully in a small part of the area, is the real solution.

Outlining this service plan for rural areas he says: "The idea which has worked out best to date, is that of the service firm which locates its headquarters centrally in the district which it will serve. It employs a number of trucks, fully equipped to take care of the vast majority of calls, and carries only one service man who drives and does the work. Jobs that can't be done from the truck are loaded and brought back to headquarters, to be dropped off on the next trip around.

"This service firm works largely through the dealers in the towns in his

area. They are more than anxious to cooperate, since it is necessary in building their sales and keeping good will in their area. The dealer, via mail, reports to the service company the work in his immediate district and daily routes are then arranged. When possible he notes in his letters just what the trouble is. (However, this is not relied on too heavily by the service firm.)

Most Work Done in Shop

"Most of the work is done in the dealer's shop and he is charged the firm's regular fee. The dealer then collects for the job from the customer according to circumstances. Certainly not all of the jobs come from the dealer, but his work has the advantage of being all in one place and he is in a much better situation to extend credit to the customer if necessary, and he can collect all the refrigerators needing service in one central location."

Mr. Bartley, at the time of the interview, pointed to the situation in his own shop. He had on hand about a dozen trade-ins some of which had been in his store "for months." All were out of order and represented a substantial tie-up of working capital. He was waiting for a refrigeration service firm in a distant city to send a man down to fix them.

"When most of the refrigerators around here get out of order," he said, "the town-tinkerer is usually called in. If it's simple enough he sometimes gets it fixed. But usually he leaves it in worse shape than before. Most dealers in this area are in the same fix I am. They have a dozen or so of boxes that need to be put into shape before they can be sold. To get them fixed we have to either send for a service man or send them to the city to be gone over.

"Our biggest problem is the fact that our customers don't understand the prices of refrigeration service. They think you should be able to get anything fixed for a dollar or two. That's why I believe service firms that come into this area should work through the dealers, then it will be his place to explain the prices of the service, and since he knows the customer, he is in the best position to do this.

"Many of the refrigerators throughout this area have been purchased from the mail order houses. During their guarantee period they are sent back to that source for repairs. Then later, if they broke down they just let them set. A similar condition exists in the areas along the new REA lines. Many of these families, with their first electric lights, etc., did not want all their electric expense at once so they bought used refrigerators, many of which have since experienced mechanical failure.

"Mostly these machines which are 'just settin'' are not being used by their owners due to lack of proper repair facilities in their immediate vicinity. However, if a service firm should come into the area and repair their neighbor's box, they would not be slow to see what could be done about their own."

Little Competition

In Mr. Bartley's opinion there are few areas in the Ozarks now, where a newly established refrigeration service engineering firm would run into any competition.

"It has always been a city-business to us," he says. "But now that the farmers are getting much better prices for their crops, and wages are increasing in the small towns, a ready-made market has opened up for competent refrigeration service firms. The area is full of refrigerators needing service and the owners, now that they are getting more income, are in a much better position to understand why most refrigerators can't be fixed for a dollar or two.

"In addition to this individual customer market, the dealers are having a hard time getting new equipment and need to put their out-of-order trade-ins to work in the sales field. The market is here, it's large and it's waiting."

S S S

S. A. Eichelberger,
Missouri.

Do not miss a copy please. Enclosed is $2.

E. C. Tyner,
Idaho.

You have a very good magazine. I thoroughly enjoy it, and get a lot of good out of it.

QUESTION BOX

(Continued from page 26)

held in the fingers melts into oil. This deposit was in the expansion valve, the short pipe to the liquid hose, and in the liquid hose. I am sending a sample of this deposit.

We have used only York refrigerating oil in this system, and we operate eight trucks from the system.

We have the same set-up here, only we merely added the twenty truck system used here to our present refrigeration system. We added a 15-ton compressor to the system to take care of the added load. We have had no trouble with the truck refrigeration here, although we have been using a cheap Shell oil.

What is your opinion of Shell refrigerating oil? The company engineer is in favor of it, perhaps because of the low price. I have doubted the quality of their oil even though the system has been operating o.k.

ANSWER: The sample of material you sent me from the York ammonia system was apparently a partially dried sludge, possibly caused by such conditions as moisture in the system, high discharge temperature from the compressor, and emulsification of the oil. To definitely lay one's finger on the cause is difficult without actually examining the system and making a thorough study of the operating practices and conditions.

It is for this reason that I would suggest that you contact Westerlin and Campbell representatives in your locality and work in conjunction with them in locating the trouble.

Sludge Comes from Oil

This sludge is probably caused by a breaking down of the oil. This statement, however, should not be construed as meaning that the oil itself is at fault, because any oil, no matter how well refined, can be broken down under certain conditions. Some of these conditions, which should be checked, and which may be contributing to the formation, are outlined in the following:

If there is sufficient moisture in the system, it is possible that the sludge is originating in the compressor crank case, and if the condition is growing worse, you may be confronted with a stuck-up compressor sometime in the future. I believe the bottom of the crank case should be checked for sludge formations immediately.

Leaky discharge valves in the compressor may cause the breaking down of the oil as it leaves the compressor. Excessive heat would be generated due to the leaky valves, and that, combined with a high gas velocity passing back and forth through the valve with the upward and downward stroke of the piston, may cause an emulsification of the oil and a sludge formation. Moisture, again, would contribute to this condition.

High discharge temperatures from the compresser, high head pressures, air in the system, insufficient condensing water, hot liquid line, and other such conditions would contribute to the formation. Moisture, of course, is a contributing factor in all these possibilities, and it will be necessary to determine where the moisture is coming from. Very likely, some was present when the system was installed.

Sources of Moisture

However, it seems that more is continually being added, since so much sludge is being formed. One of the most common causes is through leaving the oil container open, or permitting moisture-laden air to enter the container when drawing oil from it. Oil containers, of course, should be sealed at all times and tapped in such a way that only air drawn through a dehydrator is permitted to enter. Oil can absorb quite large quantities of moisture when exposed to air.

Another source may be your hose connections. Cold sweating connections may introduce quite a lot of moisture. Other servicing operations may also be a means of permitting moisture to enter. There are a number of such conditions which may cause this sludge formation. These few suggestions, however, will provide a line of thought which may lead to your discovering the trouble.

The Oil Used

I am sorry that I do not have any information on Shell refrigeration oil which would give me the opportunity of forming an opinion of this oil. I have not heard of its being used in low pressure refrigerating systems, and it is probable that the oil is designed for ammonia machines only. I might point out, however, that oils used in the modern type of ammonia system require a higher degree of refining than some of the oils used in the old ammonia systems. The reason probably for this is that the newer compressors operate at much higher discharge temperatures in comparison to the old slow-acting ammonia compressors.

A SUMMARY

of your part and ours in a

VITAL INDUSTRY

IN less than 20 years you have helped take a costly dream . . . mechanical cooling . . . and build from it a gigantic industry devoted to the betterment of mankind and dedicated to meeting the limitations of the little fellow's pocketbook.

Because of your efforts, the farmer has fresh locker-kept meat the year 'round; quick-frozen seasonable foods for the entire nation regardless of seasons; milk for our children, safeguarded from spoilage . . . even blood storage for the wounded and advanced treatment and pain alleviation for cancer victims is now possible. These and many other modern wonders you have helped make possible, and bring within everyone's reach through mass distribution and competent service that has won acceptance for your industry and its products.

Air conditioning, the right-hand partner of refrigeration, has supplemented these wonders with filtered, washed, humidified and cooled air for hospitals, factories, homes, churches, theatres, public buildings . . . and *now* air conditioning for blast furnaces, melting furnaces and Bessemer converters, so that *uniform* air supply will give uniform steel production for Defense. Yours is an industry vital to the United States in this emergency—not a luxury industry.

Here at Kerotest we are proud of our part in supplying parts essential to your industry's high standard of quality, and we are pledging our entire resources to the continuation of this practice which has made *Kerotest* Valves and Fittings an outstanding specification of the leading manufacturers.

Priority limitations will curtail our production for your industry, but 'though Kerotest Valves and Fittings may be limited in number and more difficult to obtain, you can be certain that no substitute and no sacrifice will be made in the Kerotest quality to which you have become accustomed throughout the years.

KEROTEST MANUFACTURING COMPANY, PITTSBURGH, PA.

J. C. Stocker

General Sales Manager

KEROTEST

MANUFACTURERS OF TOP QUALITY VALVES AND FITTINGS FOR THE REFRIGERATION AND AIR CONDITIONING INDUSTRY

SYSTEM OVERCHARGED BUT SIGHT GLASS SHOWS BUBBLES

QUESTION 457: I would like to ask a question on the servicing of Servel commercial units. I had to add gas (methyl chloride) to a model 40BW, and used a sight glass in the liquid line to determine when there was enough gas in the system. I know there is a valve on top of the receiver to test for gas, but I didn't have a key in my service kit so used the glass. Although the sight glass still showed bubbles, indicating a shortage, the head pressure went up too high when more gas was added, thus resulting in an overcharge. Upon releasing some of the gas, the pressure came down to normal, but upon attempting to pump down the system, the head pressure came up again.

The next day I returned with a key to fit the valve on top of the receiver, and upon opening the valve, liquid came out, indicating enough gas; yet the sight glass showed a shortage.

I would appreciate an answer to this question.

ANSWER: There are two possibilities which would cause bubbles to show in the sight glass of the 40BW Servel unit, even though refrigerant is contained in the receiver.

The first of these is that the tube leading from the receiver valve to the bottom of the receiver may have a leaky connection in the valve itself. It is my understanding that these tubes were soldered into the valve, and very rarely it occurs that a leak through the soldered joint will permit high pressure refrigerant to pass into the liquid line along with the liquid refrigerant entering the bottom of the tube. The fact that just a few bubbles are showing would indicate a rather small leak.

Screen May Be Clogged

Another possibility is that the screen in this valve, or the tube itself, is sufficiently restricted to cause a certain amount of expansion of the refrigerant as it leaves the valve. This expansion would show up in the form of vapor bubbles in your liquid gauge. This last suggestion, however, is quite remote, inasmuch as it is probable that further indication of it would be rather cold liquid line.

At this point, I don't believe the trouble is serious enough that you need do anything about it. However, it may be in the future that the condition will become such that it will affect the operation of the machine.

REFRIGERATED TRUCK

QUESTION 458: Recently I serviced an ice cream delivery truck with a ½ h.p. Kelvinator condensing unit used to cool it with a Savage cold coil. The box is 6 feet by 4 feet by 4 feet with 4 inches of cork insulation. The owner complained that it did not cool down enough and that it ran steadily from Saturday night until Monday morning.

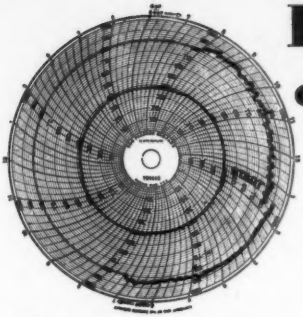
I checked the compressor for efficiency, the refrigerant charge, which is methyl chloride, and changed the superheat setting on the thermostatic valve, which is an A-P Model 207 with a .045 orifice. I made sure I was getting enough refrigerant through, and waited quite long enough to get results before making another change. The valve acted more like an automatic valve, as about the only change on the suction gauge was when I changed the superheat setting.

The box temperature changed only six degrees, that being from 28 degrees to 22 degrees, in five hours. I changed valves, putting back one like the one I took off. It seemed as though it was going to do the job, because it worked down from 12 pounds to one pound in an hour, but seemed to stay right there, and the box temperature came down only two degrees. I have left it without changing the valve setting, since it is letting the refrigerant through the coil to the thermostatic bulb and is not frosting outside on the suction line.

I thought the unit was too small for the job, but there is a ¾-h.p. Kelvinator in another truck body which is twice as large, with two of the same coils, and it does a nice job of cooling.

Will you please give me any information you can which will help me correct the trouble and get this unit to cool down.

ANSWER: Since the operation of the thermostatic expansion valve is suspected to be faulty on this application, I would suggest a simple means of checking its operation quite conclusively on the job. This can be done by simply strapping or taping a thermometer to the suction line at the point where the expansion valve is attached. The temperature of the suction line at this point should, at factory superheat adjustment, run approximately 10 to 15° above that corresponding to the operating suction pressure of the machine if the pressure drop through the evaporator coil is not over 1 to 2 pounds. If the superheat as found by the thermometer is apparently correct the expansion valve is obviously not at fault, and



Donald Nelson, SPAB executive director, *says*

"The American economy must be kept in good running order for the post-war emergency, and repair parts should be supplied to industries... Existing equipment should not be allowed to deteriorate."

Modern performance from old systems

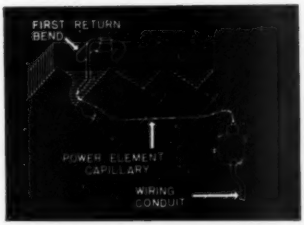
Above is a chart of temperature and humidity control with AVRGAIRE on an actual installation. Inside chart represents temperature in degrees F. Outside chart represents percent relative humidity. You can give your customers similar results with AVRGAIRE, as hundreds of other service engineers have done.

Do these jobs better with AVRGAIRE

Penn AVRGAIRE is designed for all above-freezing refrigeration applications. Walk-in coolers, reach-in cases, vegetable cases and similar installations will give better service when controlled by AVRGAIRE. May be used on single or multiple systems.

Here's how easy it is!

AVRGAIRE is a temperature control. The drawing below shows how quickly and easily it may be installed. You can forget seasonal adjustments, regardless of the compressor location.



EVERY piece of refrigeration equipment in use today is enlisted "for the duration." The burden is on service engineers. And this means more than just "maintenance and repair." It means modernization — making old machines provide modern performance in the vital job of conserving food resources.

Penn AVRGAIRE is doing this job on above-freezing applications throughout the country. It provides the accurate temperature control which prevents spoilage... the close regulation of humidity which prevents shrinkage or sliming... plus *selective defrost* to assure maximum cooling capacity from each coil and each machine.

You can help food merchants make more money... you can help conserve the Nation's food resources... you can build up your own modernization and maintenance business with Penn AVRGAIRE. Your regular refrigeration supplies distributor has AVRGAIRE. See him today.

Penn Electric Switch Co., Goshen, Indiana

PENN AVRGAIRE

the difficulty is, of course, due to some other abnormal condition in the system.

Although the letter is not too clear the general symptoms outlined therein seem to be those of a starved coil, that is, evaporator running at a very high superheat. Of course, this is generally evidenced by a low back pressure, however, since in this case that pressure remains high I am wondering if the abnormally high back pressure may not be due to a large volume of flash gas in the liquid line at the expansion valve inlet. The letter indicates that the refrigerant charge is satisfactory, however, this may have been checked at the receiver which may or may not insure a full liquid line at the expansion valve inlet. The latter can easily be checked by installing, temporarily at least, a sight glass in the liquid line at the expansion valve inlet. Of course, if the liquid level seems correct at the receiver but flashes in the liquid line at the valve inlet, there is obviously a restriction in the liquid line between the receiver and expansion valve.

Sometimes the condition occurs in a pull down that for some reason the expansion valve does not throttle and maintain its superheat. The indication in such a case, of course, would be saturated gas and liquid in the suction line, perhaps returning to the compressor. I assume that the latter is not the case as no mention is made of frosted suction line or liquid returning to the compressor. However, if the expansion valve is not maintaining its superheat at the bulb, the expansion valve needle is being held in the open position because of dirt or frozen moisture at the needle or other moving parts, or because of a defective expansion valve. I question that the expansion valve is defective because apparently he has the same difficulty with two similar valves in the same system.

Apparently, the machine is large enough for the load, and the expansion valve is much oversize for the job, but should do a fair job even at that. A .028 or .035 for methyl chloride would be ample, based on average load conditions for this type of application.

CARRIER ROOM COOLER

QUESTION 459: I have a Carrier portable air-conditioning unit, ¾-h.p., S.P. 110 volts, type 50F, serial No. 4568, that has developed trouble I cannot understand. The machine will run for about one hour and the overload relay cuts out. The head pressure is 130 and the suction pressure 35. I have not checked the voltage, but the owner said it was checked and found to be all right. The gas charge seems to be all right. Please tell me what could be causing this trouble.

ANSWER: There are three possibilities which may be the cause of your trouble with the Carrier air conditioning unit.

The first of these is low voltage, and even though the owner states that the voltage has been checked and found o.k., I take it for granted that the check was made by the Utilities Company, and that they very likely checked it at the meter, or the source of entry to the building, and even though the voltage may be o.k. at that point, it could be low at the air conditioning unit. These units are equipped with a ¾-h.p. motor, but this motor is of such a heavy winding that it develops close to a horse and a half in output, and the voltage drag is quite heavy. The wiring in the unit itself is of ample size to carry this voltage, but there is a possibility that the line leading from the meter to the unit may cause a drop. I believe it would be well worth while to check this voltage at the motor itself to be sure of this point.

The second possibility is that the overload device is defective and kicks out before it should. If you have a watt meter handy and will check the full load ampere rating of the motor against the amperes pulled while under load, you should be able to determine whether or not the motor is overloaded and whether the overload device is kicking off before it should.

The third possibility is that the belts are too tight. A tight belt, of course, will impose too much friction drag on the compressor, and would act as an overloaded motor. Apart from this, I see no possibility of trouble, since the head pressure and suction pressure indicate that the system itself is normal.

CHANGING OVER FROM ICE

QUESTION 460. I have a dealer who wants me to refrigerate a case by mechanical refrigeration, so I am sending you all the information I have, hoping you can help me out.

The case is seven feet long, three feet high, and three feet wide. It is modeled like a modern meat display case, with double glass on the front side and wooden sliding doors on the back. The top, bottom and ends are made of wood with sawdust used as the insulator. The walls are four inches thick.

The dealer has been using two to three hundred pounds of ice per day on the peak

Our Pledge
TO OUR CUSTOMERS

We know that refrigeration is essential to our modern way of life and that sales of material for this purpose are also necessary to our domestic business. We also realize that sales are just as essential to our customers. Being thoroughly conscious of these facts, we are redoubling our efforts to do everything within our power to meet delivery requirements of our customers—particularly of material necessary for repairs or replacement of existing installations.

We all know, of course, that defense materials must come first—but there will also be some materials available for domestic consumption after defense requirements have been met. Our pledge is this:

To the extent that mandatory priorities will permit, we will supply as much material as we can, and as promptly as is humanly possible under existing conditions. We will give preference to shipments being used for repair or replacement of existing installations.

We still value as our greatest asset, the cordial relations and good-will of our many customers, and even though we cannot serve them as promptly as we both would like, we will continue to do our best and to remember that their interests are also ours.

Our policy in these troublesome times is simply this:

First—To make every possible effort we can towards the defense of our country and its institutions.

Second—To make every effort to maintain for our customers business as near "usual" as possible.

MUELLER BRASS CO.
PORT HURON, MICHIGAN

load, which are broken up and placed in the bottom of the case; then a heavy wire rack is placed over the ice. The case has a drain in the center of the bottom to remove the water as the ice melts.

Would it be best to use one large coil in the bottom, or use a blower type coil? How much ½-inch tubing would it take to make a coil large enough to do the job? What size compressor? What size valve?

ANSWER: The old cases insulated with saw dust are more or less problematic when changing over to electric refrigeration. Saw dust provides a pretty good insulation, providing it is properly protected against moisture and that the rest of the construction is good, however, too often we find that such construction has absorbed considerable moisture and the insulating value of the saw dust, under such circumstances, will drop anywhere from 50% to 75% of its original value. However, since you have stated the amount of ice being used at the present time, I think perhaps we can safely work from this figure and we will use as our figure the maximum amount of ice, in other words, 300 lbs. per day, which will represent 300 times 144, or 43,200 B.t.u. per day.

Inasmuch as we do not want our machine to operate more than 16 hours per day, this load would require a machine with a capacity of 43,200 divided by 16 which equals 2,600 B.t.u. per hour.

Referring to condensing unit specifications, this would require ½ H.P. air cooled machine or ⅓ H.P. water cooled machine. For the low side I believe I would select either a forced draft air unit or a fin coil with a capacity of 2,800 B.t.u. per hour, based on 15° temperature difference between the air and the refrigerant. If you use the forced draft unit, I would suggest that it be located rather low in the case so that the air will be forced over the food products and not circulated too high in the case. If you are going to use a fin coil, I believe it should be installed in the top of the case so that natural circulation of the air will be downward and the tendency would be to refrigerate the entire space.

As a liquid control, I would use a thermal expansion valve with a .035 orifice. The refrigerant used can be either methyl chloride or Freon 12.

I don't believe that a bare pipe coil would be satisfactory installed under the food trays for the reason that you would have very little circulation and consequently little refrigeration above the coil itself.

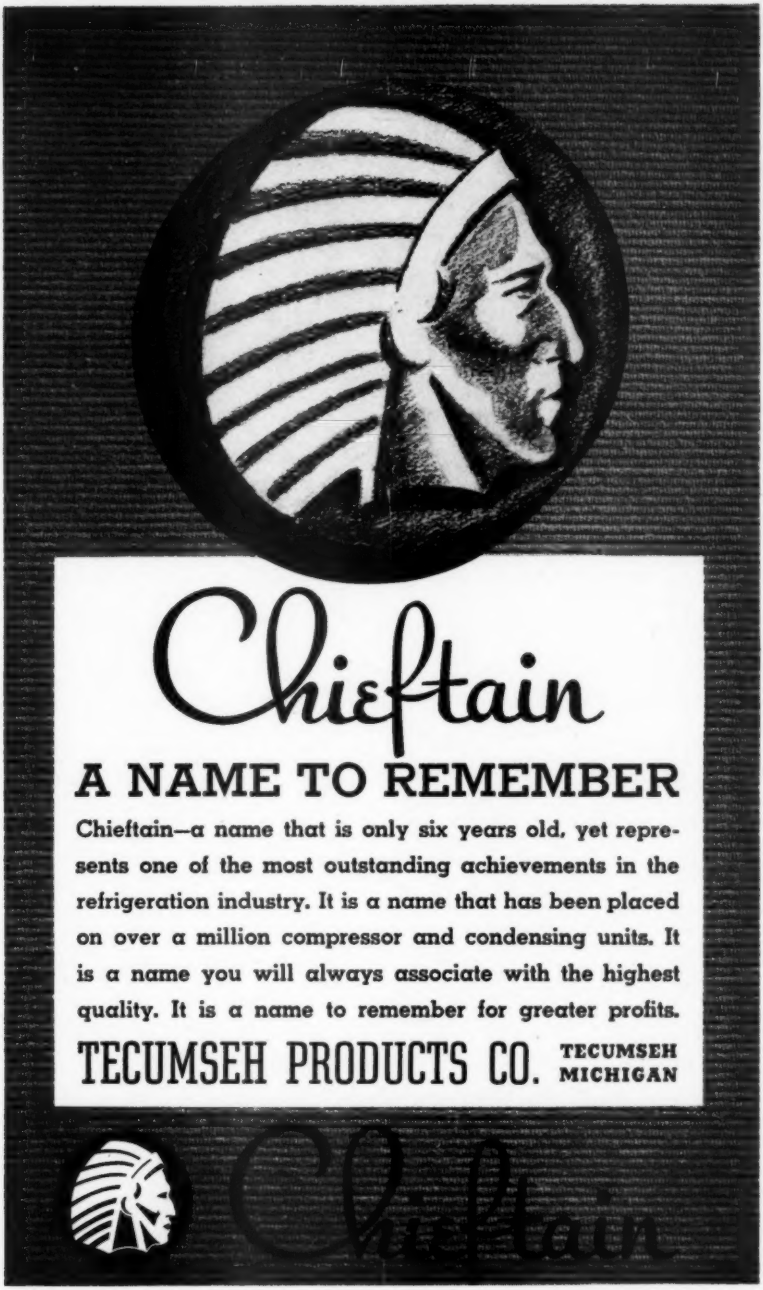
Coils installed in this location are usually dependent on contact with the food trays for any cooling effect.

Preference Rating Order Granted on Repairs for Refrigeration Equipment

IN AN order signed September 9, 1941, by Donald Nelson, Director of Priorities, repairs for the maintenance of existing refrigeration equipment as it applies to "food processing or storing" specifically mentions plants engaged in "refrigerating—wholesaling or storing of food for human consumption." This order, according to the best interpretation, makes it possible for the service and maintenance man to secure a preferential rating for such repairs and parts necessary for the continued operation of such equipment. A general priority rating of A-10 has been assigned and is fully covered in the preference rating order P-22 issued by the Office of Production Management and reprinted herewith in full.

The assignment of an A-10 classification is considered among defense ratings and is higher than any other civilian rating. It will provide that such materials as may be available after the various higher "A" ratings have been taken care of, including direct army, navy, and war requiremen s as well as other direct defense work and several classifications in the P-22 order preceding Paragraph 8 (which specifically applies to refrigeration plants) will be allocated to the repair parts necessary for refrigeration.

Definite provisions are made in securing such parts by the refrigeration field. These must be followed explicitly in order that materials for repairs for existing refrigeration equipment *used for storing food* can be secured. The order for such parts must be marked "purchase order for repairs" on "emergency inventory preference rating A-10 under preference rating order P-22," and such copies of orders must be kept by the service man for a period of two years from September 9, 1941, and separate from all other orders. This is provided so that


Chieftain
A NAME TO REMEMBER
Chieftain—a name that is only six years old, yet represents one of the most outstanding achievements in the refrigeration industry. It is a name that has been placed on over a million compressor and condensing units. It is a name you will always associate with the highest quality. It is a name to remember for greater profits.
TECUMSEH PRODUCTS CO.
TECUMSEH
MICHIGAN

agents of the Office of Production Management may make examinations of records as often as they deem it necessary.

Penalties are provided for carrying out of the order. It will be administered by an administrator of the Office of Production Management.

How to Secure Supplies on This Order

Service engineers are cautioned to use the utmost discrimination in marking such orders for materials. It will be found that all parts and supplies do not come under this order and that many of them may be secured from the local jobber without this preference rating. It should be used only on such parts and equipment which production has been restricted through the lack of basic materials. However, it is suggested that the service man check on every order he places with his jobber as oftentimes such work can be qualified indirectly as defense business. The order does not provide at the present time for the repair of domestic refrigeration and as of the date of going to press, no definite decision has been arrived at. There exists at the present time some confusion as to the administration of the order which it is expected will be finally decided upon by the administrator and additional instructions furnished.

No Provision for Jobber

In the order no provision has been made for the method in which the jobber may secure materials on this priority order. This is a serious situation and the service engineer is well acquainted with the vital function the jobber performs in acting as a convenient and economical distributing agency. It is a financial impossibility for the service engineer to maintain the extensive inventory of parts and supplies represented by the jobber's investment in his wholesale stock. At the present time the jobber's association is presenting their brief to Washington to secure clarification of the order to permit the access of materials through this channel. It is hoped that the administrator will recognize the dislocation that may occur if the usual flow of materials from manufacturer to jobber to the service man is not maintained.

Some question may arise as to what may be considered "food processing or storing." It can be safely assumed that all of the perishable foods kept in the local merchant's place of business through the various points of distribution up to the packing houses, cold storages, processing, etc., are included in this order. Further interpretations will be necessary to clarify the status of taverns, soft drink dispensers, and like equipment.

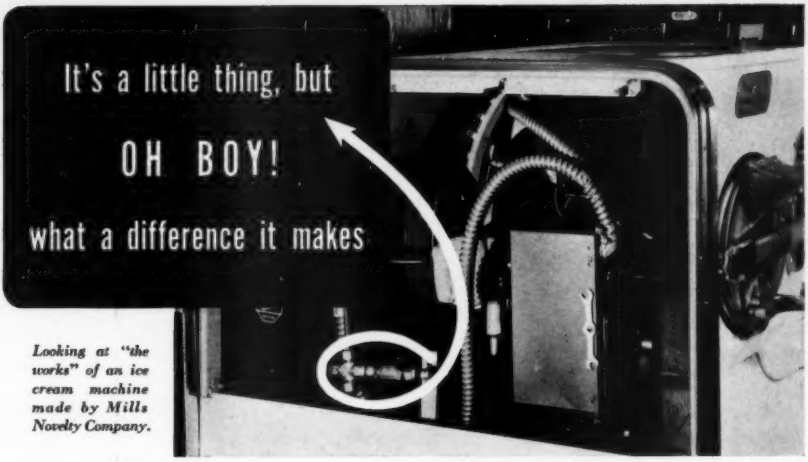
THE REFRIGERATION SERVICE ENGINEER is endeavoring to secure the correct interpretations from the governmental agencies covering these several points. Additional information will be published as soon as received. In the meantime, if any difficulty is experienced by our readers in securing parts or supplies under this order for the installations as enumerated, it is suggested that they communicate with the editor, outlining the details in full.

Preference Rating Order No. P-22

TITLE 32—NATIONAL DEFENSE
Chapter IX—Office of Production Management
Subchapter B—Priorities Division
Part 958—Repairs

958-1 PREFERENCE RATING ORDER. For the purpose of facilitating the acquisition of Material for the Repair of the property or equipment of certain industries and services hereinafter specified, a preference rating is hereby assigned to deliveries of Material for such purpose upon the following terms:

(a) Definitions.
- (1) "Producer" means any individual, partnership, association, corporation, governmental unit, or other organization engaged in one or more of the following industries and services, and such other industries and services as may be added from time to time by supplement to this Order:
  - (i) The following Federal, State, County, and municipal services: Fire and police services; Highway maintenance.
  - (ii) Carriers:
    - (a) Urban, suburban, interurban and intercity common, contract, and private carriers of passengers or freight by electric railway, electric coach, motor truck, or bus, including terminals.
    - (b) Railroad, including terminals.
    - (c) Shipping—Commercial carriers of freight and passengers by ocean, lake, river, or canal, including terminals.
  - (iii) Chemicals—Plants engaged in producing chemicals by chemical processing of raw materials.
  - (iv) Coke converting.
  - (v) Educational institutions (including vocational training).
  - (vi) Explosives—plants engaged in manufacturing explosives.
  - (vii) Farm machinery and equipment—plants engaged in manufacturing farm machinery and equipment.
  - *(viii) Food processing or storing—plants engaged in any of the following: Milling, refining, preserving, refrigerating, wholesaling or storing of food for human consumption or livestock feed.*
  - (ix) Highway maintenance and equipment—plants engaged in the production of equipment used in highway maintenance.
  - (x) Hospitals, clinics and sanatoriums.
  - (xi) Lumber—plants engaged in the production of lumber (including planing, drying, storing and treating of lumber), cooperage, plywood and millwork.



Looking at "the works" of an ice cream machine made by Mills Novelty Company.

That's a Kerotest dehydrator cartridge, charged with Alorco Activated* Alumina. Placed permanently in the system, it dries the refrigerant DRY, and keeps it that way.

Mills Novelty Company protect all their refrigerating machines in this way. No waiting for trouble-making moisture to show its hand with frozen valves, corrosion, and the formation of sludge. Mills get the jump by eliminating it. The Activated Alumina takes out every trace of moisture.

Alorco Activated Alumina is doing this same efficient, dependable drying job for many manufacturers and users of refrigerating equipment, large and small. And by removing acid from the system, regenerating the oil, it prevents corrosion and reduces wear.

Your supply house can furnish cartridges and dehydrators charged with Alorco Activated Alumina. ALUMINUM COMPANY OF AMERICA (*Sales Agent for* ALUMINUM ORE COMPANY) 2159 Gulf Building, Pittsburgh, Penna.

*Registered Trade-mark

These manufacturers supply dehydrators charged with Activated Alumina:

American Injector Co.
Fedders Mfg. Company
Henry Valve Company
Imperial Brass Mfg. Co.
Kerotest Mfg. Company
McIntire Connector Co.
Mueller Brass Company
Cyrus Shank Company

★ ALORCO ★
ACTIVATED ALUMINA
DRIES REFRIGERANTS DRY

(xii) Metallurgy—plants engaged in the production of metals and alloys.
(xiii) Mines and quarries (including ore dressing or processing plants and smelting facilities).
(xiv) Newspapers—plants engaged in the publication of newspapers.
(xv) Petroleum production, refining and transportation—plants and equipment used in petroleum production, refining and transportation.
(xvi) Radio—Commercial broadcasting and communication (not including home receiving sets).
(xvii) Research laboratories—industrial and academic.
(xviii) Rubber and rubber products—plants engaged in the production of rubber and rubber products including reclaimed and synthetic rubber.
(xix) Shipyards and Ship Repair Yards engaged in building and repairing ships (excluding yards devoted principally to pleasure craft).
(xx) Telephone and telegraph communication.

(2) "Material" means any commodity, equipment, accessories, parts, assemblies, or products of any kind.
(3) "Repairs" means only repairs needed because of an actual or imminent breakdown, from whatever cause, of a Producer's property or equipment.
(4) "Emergency Inventory" means minimum inventory of Material required to provide for Repairs to meet an actual or imminent breakdown, from whatever cause of a Producer's property or equipment.
(5) "Supplier" means any person with whom a purchase order or contract has been placed by a Producer or any Supplier for
(i) Material to be used for Repairs;
(ii) Material required for a Producer's Emergency Inventory;
(iii) Material to be physically incorporated in other Material which is to be used for Repairs or which is required for a Producer's Emergency Inventory.

(b) *Assignment of Preference Rating.* Subject to the terms of this Order, Preference Rating A-10 is hereby assigned.
(1) to deliveries to a Producer of Material required by him for Repairs or for his Emergency Inventory;
(2) to deliveries to a Supplier of Material which is, in turn, to be delivered to a Producer for Repairs or for his Emergency Inventory or to be physically incorporated in Material to be so delivered.

(c) *Persons Entitled to Apply Preference Rating.* The preference rating hereby assigned may be applied by
(1) a Producer;
(2) a Supplier, provided that he requires the Material so purchased in order to make deliveries duly rated pursuant to paragraph (b).

(d) *Application of Preference Rating.*
(1) A Producer in order to apply the preference rating to a delivery of material to him must endorse the following statement on the original and all copies of the purchase order or contract for such Material signed by a responsible official duly designated for such purpose by such Producer.
"Purchase Order for Repair or Emergency Inventory—Preference Rating A-10 under Preference Rating Order P-22."
Such endorsement shall constitute a certification to the Office of Production Management that such Material is required for the purposes stated therein. Any such purchase order or contract shall be restricted to material the delivery of which is rated in accordance herewith.
(2) A Supplier in order to apply the preference rating to a delivery of Material to him must endorse the following statement on the original and all copies of the purchase order or contract for such Material signed by a responsible official duly designated for such purpose by such Supplier;
"Purchase Order for Material required to fill a duly rated order for Repair or Emergency Inventory. This purchase order bears Preference Rating A-10 under Preference Rating Order P-22."
Such endorsement shall constitute a certification to the Office of Production Management that such Material is required to fill an order placed by a Producer or Supplier duly rated in accordance herewith. Any such Supplier's purchase order or contract shall be restricted to Material the delivery of which is rated in accordance herewith.
(3) A Producer or Supplier placing any such rated purchase orders or contracts and the Supplier selling the Material covered thereby, must each retain endorsed copies of such purchase orders or contracts segregated from all other purchase orders or contracts for a period of two years from the date thereof for inspection by authorized representatives of the Office of Production Management.

(e) *Restrictions of Application of Rating.* The Preference Rating hereby assigned shall not be applied
(1) by a Producer to obtain Material in excess of his requirements for Repairs or for his Emergency Inventory;
(2) unless the Material to be delivered cannot be obtained when required without such rating;
(3) by a Supplier to obtain Material in excess of the amount necessary to make rated deliveries.

(f) *False Statements and Penalties.* Any person who applies the preference rating hereby assigned in wilful violation of the terms and provisions of this Order, or wilfully falsifies records required to be kept or information to be furnished pursuant to this Order, or who obtains a delivery of Material by means of a material and wilful misstatement will be prohibited from further applying said rating. Such person may also be prohibited from obtaining further deliveries of material under allocation and be deprived of any other priorities assistance. The Director of Priorities may also take any other action deemed appropriate, including the making of a recommendation for prosecution under Section 35A of the Criminal Code (18 U.S.C. 80).

(g) *Revocation or Modification.* This Order may be revoked or amended by the Director of Priorities at any time in whole or in part or in its application to any Producer or any Supplier. In the event of revocation, or upon expiration of this Order, deliveries already rated pursuant to this Order shall be completed in accordance with said rating, unless the rating has been specifically revoked. No additional applications of this rating to any other deliveries shall thereafter be made by any Producer or Supplier affected by said revocation or expiration.

(h) *Effective Date.* This Order shall take effect on the 9th day of September, 1941, and unless sooner revoked shall expire on the 28th day of February, 1942.

(P.D. Reg. 1, Aug. 27, 1941, 6 F.R. 4489; O.P.M. Reg. 3, March 8, 1941, 6 F.R. 1596; E.O. 8629 Jan. 7, 1941, 6 F.R. 191; E.O. 8875, Aug. 28, 1941, 6 F.R. 4483; sec. 2(a), Public No. 671, 76th Congress, Third Session, as amended by Public No. 89, 77th Congress, First Session; Sec. 9, Public No. 783, 76th Congress, Third Session.)

(Signed) D. M. Nelson.

Donald M. Nelson,
Director of Priorities.

New service manual shows how you can...

✓ **INSURE OPERATION OF EQUIPMENT EMPLOYING "FREON-12"**

✓ **CREATE CUSTOMER GOODWILL**

✓ **BUILD FUTURE BUSINESS**

Booklet doubly valuable today . . .

AS MUCH "Freon-12" refrigerant is being made as ever. Defense needs are taking a big percentage of it, however, and production cannot be greatly expanded at this time because of the limited supply of an essential raw material.

But you can relieve this situation, help the entire refrigeration industry, and at the same time build up customer acceptance of maintenance service that will carry over to normal times.

SELL CHECK-UP SERVICE NOW WHEN PATIENT IS WORRIED

SEND FOR BOOKLET NOW. Follow the lead of the Chinese Doctor—who serves by keeping patients well. This service manual will help you keep your patients well.

A great conservation of "Freon-12" can be made in servicing equipment and in handling. If present waste and losses of "Freon-12" are eliminated, the saving will compensate for existing shortages—make "Freon-12" available for new equipment that in turn means more business for you.

That's why this booklet is doubly valuable. It has been prepared as a helpful guide to assist you in making the most of your new opportunity—a regular check-up service to reduce waste and losses.

This manual serves a timely purpose as a check list for practices that will reduce waste and losses. Detailed procedures are given for transferring this refrigerant and detecting leaks. Included are suggestions for meeting current and seasonal servicing opportunities.

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FREON

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safe refrigerants

**"Freon" is Kinetic's registered trade-mark for its fluorine refrigerants.*

KINETIC CHEMICALS, INC., TENTH & MARKETS STREETS, WILMINGTON, DELAWARE

REFRIGERATOR PRODUCTION CUT CREATES MORE SERVICE WORK

THE government ordered makers of household mechanical refrigerators, September 30, to cut production for the last five months of 1941 to a level 43.2 per cent under average monthly output for the year which ended June 30, and warned that cuts in 1942 "will probably be greater."

Thirty factories employing 45,000 workers will feel the curtailment imposed by Priorities Director Donald M. Nelson as a means of conserving steel and other strategic materials for defense needs.

It was the second drastic cut imposed on an industry producing durable consumer goods. Auto production for December recently was cut 48.4 per cent, and similar limitations are expected soon for washing machines, household ironers, vacuum cleaners and other items.

The refrigerator order was based on recommendations of Leon Henderson, director of civilian supply, whose program called for production of only 2,007,000 refrigerators in the twelve months beginning Aug. 1, 1941, as compared with 3,670,000 units in the twelve months ended June 30, 1941.

Officials of the division of civilian supply said impact of the limitation order would be felt principally in the ten cities which produce 90 per cent of the electric and gas refrigerators in this country—Detroit, Cincinnati, Indianapolis, Chicago, Dayton, O.; Schenectady, N. Y.; Evansville, Ind.; Muskegon, Mich.; Mansfield, O., and Greenville, Mich.

The office of production management is at work on plans to relieve the threatened idleness in these regions, directing its efforts toward placing qualified workers in defense work.

To the service engineer this order means an additional 1,578,100 domestic units yearly to be kept in service, which in normal times would be replaced by new units. This figure is based on the last year's production.

Refrigeration Service Engineers' Society

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

The Road Ahead

NO one in our industry fails to appreciate that the road ahead for service engineers is likely to be blocked by many obstacles of many different kinds. There is, first of all, the very immediate problem of doing first class service and installation work under the handicap of material shortages. To this should be added the future possible "headache" of servicing units built of unfamiliar substitute materials, or making use of strange refrigerants. And topping it all, there is the sheer vastness of the servicing problem involved in putting back into circulation many discarded units which are certain to be needed because of curtailed new-unit production.

With the vision of this rocky road ahead clearly in mind, the wide-awake, far-seeing service man of today should see the Refrigeration Service Engineers Society in an altogether new and far more important role than he has heretofore. For indeed, never before in the history of the industry has the accomplishment of the objectives of this organization been so important to every member.

Let's briefly review one of the principal objectives and interpret it in the light of conditions now facing us.

"To further the education and elevation of its members in the art and science of refrigeration engineering"—the number one purpose to which R.S.E.S. is dedicated. Refrigeration and Air Conditioning are swiftly moving fields. Not a year goes by without the invention of many new devices, or the discovery of new applications of fundamental principles, or the introduction of new types of equipment. This being true, refrigeration service is as much a matter of technical knowledge as mechanical skill. Hence, in R.S.E.S. chapter meetings as well as in its publication, the values of service men's education and training are stressed.

"The Chart is a necessary part of my equipment"

so says this service man

• Now that the Calculator is being put to the test of practical use in the field, we have had a number of letters from service men testifying to its value. This one is typical.

Sometime ago I purchased a Head-Back Pressure Calculator from you, but misplaced it. The chart is a necessary part of my equipmemt, so please send me another.

J. V. Farmer

WRIGHT'S

H. B. P.

CALCULATOR

The purpose of the Head-Back Pressure Calculator is to quickly determine the proper head pressure, for the following refrigerants when the suction pressure, room temperature or mean water temperature is known.

Carrene — Methyl
Isobutane — Freon or F-12
Sulphur Dioxide — Ammonia
Carbon Dioxide

Actual Size 3½" x 3½".

A Vestpocket Tool Every Service Man Should Carry

A number of troubles can be detected by comparison of the existing head pressure and what the head pressure should be, but in the past there has been no convenient method available to the service engineer to determine what the correct head pressure should be. Such variable conditions as the suction pressure, room temperature, water inlet and outlet temperature, kind of gas used, etc., all determine the proper head pressure. It is not practical to depend on one's memory of other similar conditions or to just use snap judgment when this handy calculator gives you the correct answer so easily. Send for it today! Sturdily constructed, with oil-proof finish, for on-the-job use.

POSTPAID $1.00

NICKERSON & COLLINS CO.

435 N. WALLER AVE., CHICAGO

METER-MISER servicing means more money for YOU

HERVEEN enables you to service these hermetic units

★ At present, and as far as we can see into the future, there is an ample supply of *Herveen* available. This is the replacement gas which enables the well-equipped service shop to handle the repair of Frigidaire Meter-Misers.

So . . . count on *Herveen* for this season at least, if your jobber doesn't handle it (most do) write us direct.

HERVEEN

MODERN GAS CO., Inc.

Manufacturers and Refiners

1084 Bedford Ave., Brooklyn, N.Y.

Informing, authoritative papers are read and published to keep members up-to-date. There are talks and discussions of basic principles designed to enlarge the fundamental technical knowledge of members.

The problems facing us today put a high premium value on such enlarged knowledge. Therefore, never before has society membership and regular attendance at chapter meetings promised to be so valuable to service engineers. Papers, discussions, and lectures this year will deal at length with service problems occasioned by the disruption of the industry due to national defense requirements. But the long-range viewpoint will not be overlooked, for it is clear that when the present crisis passes, our industry will be face to face with major readjustments.

Men Must Be Better Informed

Exactly what burdens this readjustment will throw onto the service man's shoulders no one can clearly see at this time. But it does seem logical that whatever they are they will best be borne by service men whose mechanical skill is fortified by the type of fundamental technical knowledge and up-to-the-minute information disseminated by R.S.E.S.

Probably among the factors to be considered in the future is that of supply and demand—not of materials but of competent service men. This will not be the first time that the industry has eyed this question. In fact, it can be assumed that after the present emergency, we will be in a period which very nearly parallels one of several years ago. At that time, condemning attention was brought to the fact that there were many men engaged in training for service work in the refrigeration industry. The hue and cry was that this new crop of technicians was threatening the service men then in business, and would surely swamp the industry in the future with too many service men.

Of course, what actually happened—and will probably happen again—was a far cry from that gloomy prediction. In the first place, refrigeration, as well as air conditioning, has far exceeded its predicted growth. Simplified construction and improved manufacturing brought domestic refrigeration within pocketbook-range of families in almost all walks of life. Extensive expansion of rural electrification brought refrigerators to thousands of farm homes. All the while America was cultivating a taste for better kept foods—and

retail markets were answering by the wholesale purchase of commercial refrigeration units for counter coolers, reach-in boxes, and display cases. Naturally, this tremendous surge toward refrigeration automatically provided ample work for men qualified to render proper installation and maintenance service.

An equally important factor in bursting that bubble of too much man-power in the industry was the attitude of the bulk of the men engaged in the industry. Alert service men quickly recognized—then as now—that the introduction of new models, new applications, and new methods of operation called for more than the old cut-and-try methods of refrigeration service on their part. It was evident that the demand was for men who were trained in the fundamentals of refrigeration and who had the basically sound knowledge of the principles involved in the newer techniques. Consequently, training of one kind or another became a definite part of the program of many men.

Shortage of Men Now

What has finally happened is well known to us all. Supplementing the men within the industry, who have kept abreast of its swift expansion, with the competently trained technicians turned out each year by reputable technical training institutions, we are right now faced with an all too evident shortage of capable refrigeration service and maintenance engineers. Indeed, it actually appears now that there should have been a greater effort in the past to recruit even more men into the industry instead of inferring that we were approaching a saturation point.

The growth of refrigeration and air conditioning continues. One of the outcomes of the present conflict will undoubtedly be the discovery of even more applications and wider uses of cooling and air regulation. Logically, then, the future will call for more and better educated and trained service engineers to install and maintain equipment.

It is this long-range program that the R.S.E.S. stands for, and earnestly invites your cooperation by urging you to better prepare yourself for the future by attending society meetings and by entering into society activities. In short, Refrigeration Service Engineers Society is squarely facing the problem of "The Road Ahead" and proposes to make it as smooth as possible for every member.

Ask for
YOUR COPY...

● By all means *get your copy* of this big, informative, positively indispensable manual and catalog of motor-starting capacitors and their usage.

The new 1941 Edition contains more pages, more listings, more practical data than ever before. 28 pages of "real meat" for those who service electric refrigerators. Handy listings arranged according to motor types, and also according to Aerovox capacitor types. Where feasible, you have the choice of either the exact-duplicate or the universal replacement. It's all so simple when you use Aerovox listings.

Ask your local jobber for a copy —or write us direct. Meanwhile, *insist* on Aerovox capacitors for really profitable servicing.

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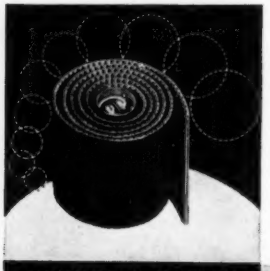
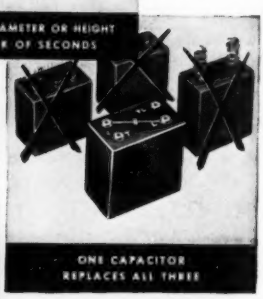
When you standardize on Mallory you can give better service at better profit to yourself because you can cover every replacement need with half the usual inventory investment. Round types MSU are encased in the smallest possible metal containers. Each is provided with a specially developed "size adjuster" that provides any needed diameter up to 3" and any height up to 4¾". You simply trim it at the desired places. Rectangular types MSG and MSF are packed with complete hardware for every replacement requirement.





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Write today for Catalog M-801 giving complete details and replacement recommendations.

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P. R. MALLORY & CO. Inc.
MALLORY

CHICAGO IN JANUARY

"For What Ails You"

Are you suffering from shortage of parts? Have Freon shortages given you the jitters? Are you confused over the new excise taxes? Does the matter of increased records required by the new tax laws get you down?

If you are not affected by one of these "ailments," you must be a superman. If you are affected by one or all of them, why not seek relief and information at the only clinic where a diagnosis of your troubles may be obtained.

Plan Now to Attend

8th Annual R.S.E.S. Convention

JANUARY 12-15

TRENTON CHAPTER DRAFTS PETITION

A MOVEMENT is under way in the Trenton Chapter which is designed to impress their congressman with the importance of an uninterrupted flow of replacement parts for the service field. A petition has been drafted and is to be signed by the commercial customers of each member, then forwarded to the congressman of their district.

It is the opinion of the chapter that if others would join in such a campaign, worth while results may be obtained. It is their intention to draft another petition, at a later date, for domestic customers.

A reproduction of the petition follows:

We, the undersigned, are dealers in perishable foods, and maintain that our commercial refrigeration is absolutely essential to preserve public health and conserve our food supply, and as such is just as necessary for defense as guns, planes and battleships. In fact, refrigeration is defense for our health and food supply, and thus for the entire country.

Therefore, it is of vital necessity that replacement refrigeration parts and equipment be given a very high priority rating for the maintenance of our present refrigeration equipment.

FIRM ADDRESS	INDIVIDUAL	APPROX. CUSTOMERS

ILLINOIS STATE ASSOCIATION ANNUAL CONVENTION

DURING the two days of October 18th and 19th at the Leland Hotel, Aurora, Illinois, men of the refrigeration industry from all parts of Illinois and surrounding states will meet and discuss their mutual problems as they have done for the last several years. The problems of the men this year, however, have been multiplied many times as a result of our present emergency.

Keen interest in the educational program is going to be shown by a very much enlarged attendance, who will be seeking an answer to their most urgent questions. Some of these answers will be provided by the speakers on the following program. Others will be provided in the informal discussions that take place. It will be an informative meeting to say the very least.

Saturday, October 18

8:30 A.M.—Board of Directors Meeting, Registration, Opening of Convention, Appointment of Convention Committees.

1:00 P.M.—Ladies' Bingo Party.

1:00 P.M.—Opening of Convention, Invocation, Report of Nomination Committee.

1:15 P.M.—"Moisture Problems" by R. B. Stevenson, Davison Chemical Co.

1:45 P.M.—"Priorities" by J. S. Kimmel, Republic Electric Co.

2:15 P.M.—Annual Business Meeting. Reading of Minutes. Reports of Retiring Officers. Reports of Committees. Election of Officers.

3:15 P.M.—"The Ideal Service Man"—A playlet by the Tri County Chapter Players. Motion Picture, "Look to Lockheed for Leadership," Courtesy United States Army. "1940 Convention Pictures" by Herman Goldberg.
NOTE: Ladies of Convention are invited to attend.

7:30 P.M.—Annual Banquet and Dance. Music by Dick Bates and his Orchestra.

Sunday, October 19

11:05 A.M.—"The Hermetic Compressor Model 1912" by Harold Anderson, President, Tri County Chapter.

11:15 A.M.—"Ultra Violet Ray in Refrigeration" by Fred Strombeck, Sperti Electric Co.

11:45 A.M.—"Practical Installations of Blower Coils using Solenoid Valves and two temperature Controls" by R. S. Dunlop, Ranco Controls.

12:30 P.M.—"Court Quiz," a round table discussion for the convention program.

12:45 P.M.—Final Business Meeting. Consideration of Next Convention City.

YOU'RE GOING TO NEED
THAWZONE
The Moisture Destroyer
BETTER TRY IT NOW!

An old friend is one that is *always ready* when you need him and can be depended upon to give a good account of himself.

In these hectic days, it's a comfort to know that there is a real dehydrant available that has been used by service engineers for over 4 years. During that period, THAWZONE has made a host of friends, due to its dependability, safety, economy and ease of handling.

Make THAWZONE an "old friend" of yours, by getting acquainted with it *now* and letting it prove its value to you. ASK YOUR JOBBER for the original package with the blue, white and black label.

HIGHSIDE CHEMICALS CO.
NEWARK, N. J.

THAWZONE
Fully Protected by U. S. Patents
The PIONEER FLUID DEHYDRANT

DU PONT
REG. U. S. PAT. OFF.
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You get the help of Du Pont Research and Technical Assistance with Preferred METHYL CHLORIDE.
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E. I. DU PONT DE NEMOURS & COMPANY (INC.)
The R. & H. Chemicals Department
Wilmington, Delaware
District Sales Offices: Baltimore, Boston, Charlotte, Chicago, Cleveland, Kansas City, Newark, New York, Philadelphia, Pittsburgh, San Francisco

New York State Association Convention All Set

PLANS for the New York State Association convention to be held at the Hotel Astor, New York, N. Y., October 23-24 are now complete with every prospect for a successful meeting.

Attendance is expected to be large, because now more than ever before, association meetings are of extreme importance. In the face of shortages of material, curtailment in production of new machines and widening application of sales and excise taxes, there are many new problems arising each day which demand a solution. There is no better place to solve these problems than in association meetings. The program for the two days, which follows, includes ample time for business discussions, educational features and entertainment.

Thursday, October 23, 1941

10:00 A.M.—Convention called to order by E. J. Merenda, President, New York Chapter.
10:15 A.M.—Introduction of State Officers, Address by President, Secretary's Report, Treasurer's Report.
10:45 A.M.—Movies presented by Mr. Eldridge, Virginia Smelting Company.
11:00 A.M.—Brazing in the Refrigeration Shop, by R. N. Chaplin, Air Reduction Sales Co.
12:00 Noon—Committee Reports. Appointment of Convention Committees.
1:30 P.M.—Meeting of Convention Committees. Report of Nominating Committee and Election of Officers.
6:30 P.M.—Banquet—Movie and Talk "Know Your Money" by F.B.I. Representative.

Friday, October 24, 1941

9:00 A.M.—Information Please.
10:00 A.M.—Why Oil Separators, by Ed. Kellie, American Injector Co.
10:30 A.M.—Controls and Food Preservation, by R. H. Luscombe, Penn Electric Switch.
11:00 A.M.—The Making and Preservation of Ice Cream, by E. J. Newcomer, Mills Novelty Co.
1:30 P.M.—Modern Air Conditioning of Today and Its Future. Movie—Weather by Carrier, by D. A. Newton, Carrier Corporation.
2:15 P.M.—War Department Talk, by Edwin Kingsley, Zone Principal Mechanical Engineer, Office of the Zone Construction, Quartermaster Zone 2.
3:00 P.M.—Report of Convention Committees. Introduction of New Officers.
9:00 P.M.—Get together party.

LADIES' PROGRAM

Thursday, October 23, 1941

10:00 A.M.—Business Meeting.
1:00 P.M.—Trip to Museum of the City of New York.
6:30 P.M.—Banquet.

Friday, October 24, 1941

10:00 A.M.—Meeting.
1:00 P.M.—Subway Ride to Ferry, Ferry Ride to Statue of Liberty and a Tour of the Statue.
9:00 P.M.—Get together party.

WE'LL SHOW YOU
WHAT SERVICE MEANS

ON EVERY TYPE OF
AIR CONDITIONING
AND REFRIGERATION
SUPPLIES AND EQUIPMENT

WRITE FOR
CATALOG ON
YOUR LETTERHEAD

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SERVICEMEN IN EASTERN STATES HAVE PROBLEM OF THEIR OWN

A LETTER received from Ernest E. Condon, New York, reveals the situation there arising from the gasoline curfew. This situation should be of interest to every service engineer in the eastern states. An effort is being made by the New York Association of refrigeration service engineers to secure a solution to the problem. All servicemen in the area who are experiencing the same trouble are invited to get in touch with the association through its secretary, E. E. Condon, 36-01 Lawrence Street, Flushing, New York. Excerpts from his letter follow:

. . . As you know, throughout the east all gasoline stations are closed at 7 o'clock, yet police departments, fire departments, ambulances and doctors can obtain gasoline with no trouble at all.

. . . It so happens that I had to stop after 7 o'clock to try to get gasoline . . . On the opposite side of the pump that I drew up to was a doctor's car filling up with gasoline after the owner of the premises had refused to sell me the gasoline. I asked the attendant, "How come this fellow can get gasoline and I can't." His answer was, "He is a doctor and on an emergency trip, returning to his office." I figured any way to get gasoline is a good way. My words were these, "I'm as much of a doctor as the man on the other side of the pump. It so happens that I'm in the refrigeration repair service business and when I go out it is strictly an emergency.

. . . Here's the purpose of this letter. I know that in the east, especially in the Metropolitan area, there have been many servicemen out on calls who have been stuck when they try to get gasoline after 7 P.M. I am wondering whether or not it would be possible for refrigeration and air conditioning servicemen on night duty to be served gasoline in a case of an emergency.

. . . I feel that the way this project might be achieved is by writing to the Gasoline Control Board in Washington, D. C., outlining to them the importance of refrigeration and air conditioning servicemen on emergency service. I believe something can be done about this.

. . . I feel certain that we could have issued to the refrigeration men . . . the same cards issued to doctors, ambulances, etc., listed above. . . .

USE

FOR DRYING AIR REFRIGERANTS INDUSTRIAL GASES

DRIERITE is an Efficient, Rapid, Economical Dryer for all the Modern Refrigerants. Dries both by Chemical Action and Adsorption.

Used in Dehydrators by leading manufacturers and furnished to the Service Engineer by leading Supply Dealers.

Write for literature.

W. A. HAMMOND DRIERITE CO.
YELLOW SPRINGS, OHIO

Do You Need
IMMEDIATE
DELIVERY

Your orders to AUTOMATIC are ALWAYS scheduled for immediate delivery. We realize the importance of having your material when you need it.

COMPLETE STOCKS

We carry one of the most complete stocks of refrigeration, air conditioning and heating parts and supplies in the country. In these days of material scarcity you can depend on AUTOMATIC.

SERVICE

Our service not only includes immediate delivery, but the exact item you ordered shipped—THE SAME DAY WE RECEIVE YOUR ORDER.

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HEATING & COOLING
SUPPLY CO.
647 W. LAKE ST., CHICAGO, ILL.

R.S.E.S. Chapter Notes

Under this heading will appear news of the chapter meetings. For names of the officers and dates of regular meeting nights, please refer to the Chapter Directory.

PITTSBURGH CHAPTER

September 12—The meeting was called to order and the minutes of the previous meeting were read and approved. The application of J. C. Vandall for membership was accepted and Mr. Vandall recommended as a member. The educational feature of the evening was a discussion of the proposed code, and in discussing future educational features, it was suggested that a lecture from a representative of Virginia Smelting Company or Ansul Chemical Company on the method of changing from Freon to methyl chloride be requested.

ROCKFORD CHAPTER

September 15—The meeting was called to order with a good representation of the total membership present. Chapter business occupied the first part of the evening with some of the minor details of the forthcoming Thanksgiving stag being discussed. The dance was again discussed and the date set for October 25th. The place was not decided upon. The auxiliary is making arrangements to provide and sell the necessary refreshments. Admission will be $1.00 per couple. Another discussion during the evening was on the possibility of providing a luncheon at the next meeting. All the members seemed to be agreeable to the plan and it was decided that each member would pay the amount of 25c towards the expense of the eats. The balance of the expense would be taken out of the treasury.

TRI-COUNTY CHAPTER

August 1—The meeting was called to order by President Anderson at the Leland Hotel in Aurora. The entire evening was devoted to discussions of the forthcoming state convention, with the various committee men reporting all arrangements which have been completed to date and the ironing out of future plans. Among the reports received was that of the Program Committee in which Mr. Stafford reported that quite a number of ads have been sold to date.

August 15—This was a special meeting of the Board of Directors, called for the purpose of discussing a future educational pro-

gram. Some time during the evening was devoted to plans for the state convention, however, the following program required the major attention of the group:

Joliet, September 5—Discussion on Priorities.

Elgin, September 19—Ideal Serviceman Sketch.

Aurora, October 13—Film-Weather by Carrier. October 18 & 19—State Convention in Aurora.

Joliet, November 7—Evaporative Condensers and Fred Johansen-Service Angle.

Elgin, November 21—Superior Valve & Heat Exchanger.

Aurora, December 5—Excursions in Science and Film on Traveling.

Joliet, December 19—Oddities in Refrigeration.

Elgin, January 9—Annual Business Meeting.

September 5—This meeting was held in Joliet, Illinois. The attendance prize was drawn in favor of A. E. Wolff. On the educational feature of the evening, Gene Morrison, of the Automatic Heating & Cooling Supply Company, gave an interesting talk on priorities and the part they will play in the refrigeration industry during our present emergency.

TWIN CITIES CHAPTER

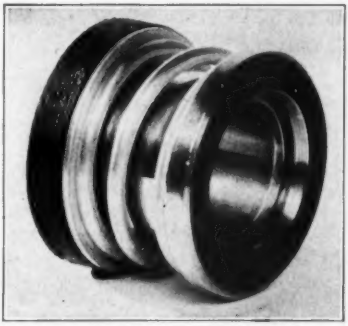
September 2—The meeting was called to order by President Palen with a large part of the membership in attendance. The greater part of the evening was devoted to discussions and resolutions concerning the present defense situation and its effect on the refrigeration field. Mr. Ost reported for the Rates Committee and in addition read a letter from the Kinetic Chemicals Company regarding the deliveries of Freon refrigerant. Perry Copeland read a draft of a letter which had been written for the purpose of mailing to the Office of Production Management. A general discussion followed the reading of this letter and many points contained therein were satisfactorily ironed out. Mr. McCafferty suggested that all servicemen request their customers, including housewives, butchers, grocers, etc., to write their congressman regarding the shortage of replacement parts and the importance of refrigeration service in the defense effort. A great deal more discussion on the same subject took place and each serviceman was urged to write his congressman, impressing him with the necessity of continued supply of materials for the maintenance of refrigeration equipment.

It's Portable - It's Profitable

NO SERVICEMAN CAN AFFORD TO BE WITHOUT THIS ALL-WEATHER PROFIT-MAKER

Get the Dayton V-Belt Service Kit for "on the job" V-Belt replacement service for all leading makes of automatic refrigerators—this compact, durable Swedish Fibre case contains visible assortment of 43 fractional horsepower V-Belts plus handy V-Belt Matchometer —only $23.48. See your jobber or write.

THE DAYTON RUBBER MFG. CO.
DAYTON, OHIO



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"ANTI-FRICTION"

SHAFT SEALS

ON NEW—AS WELL AS ON OLD, WORN AND SCORED SHAFTS.
A Complete Line.
See Your Jobber.

SYNTRON CO., HOMER CITY, PA.

FOR DEFENSE

—and for *defense* against seasonal slumps, increase your servicing capacity with a thorough knowledge of AIR CONDITIONING. Learn it the U.E.I. way—combining Home Study and Actual Shop Work. As a R.S.E. you have a head start and can progress quickly.

Today is the day to write for more information.

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NEW MOTOR OPERATED VALVE

ALL PURPOSE GENERAL CONTROLS HYDRAMOTOR VALVE CONTROLS WATER, AIR, GAS, OIL, BRINE, GASOLINE, STEAM, ETC. *accurately and positively.*

Pressures up to 150 lbs. per sq. in.

Temperatures up to 400° F.

ENTIRE OPERATOR SEALED IN OIL FOR LIFE. No annual maintenance. Get the details today for this amazing all-purpose motor valve. Has simplified two-wire, current-failure control. Available normally open or normally closed. Slow opening; slow closing. No gears; only one internal switch. Low current consumption. Operates in any position. Described in new 1941 Catalog. Write for it today.

GENERAL CONTROLS

450 E. Ohio St. Chicago, Ill. | 267 5th Avenue New York City

August 5—A report was given by the Picnic Committee, thanking all committee members for the cooperation in arranging for and conducting the picnic. A financial report for the picnic showed that the income received from the sale of tickets and monies received from various manufacturers would come within a very few dollars of covering all the expenses involved. Discussion was had on the Minneapolis refrigeration ordinance and its effect on the present Freon situation. Mr. McCafferty suggested that contact be made with the Minneapolis Fire Department in order to secure their views on the possible necessity of changing to methyl chloride.

NIAGARA FRONTIER CHAPTER

Plans are being completed by John K. Bush, President of the chapter for the fall and winter meetings. The first meeting of the season to be held October 1st and to continue on the first and third Wednesday of each month throughout the season. To help him in these arrangements he recently appointed Leon McCormick as chairman of the Entertainment Committee and A. H. Keirn as chairman of the Educational Committee.

An announcement recently received from the chapter concerned the marriage of Stanley Szyszkowski and Phyliss Surma, of Dunkirk, New York, on September 1st. Mr. Szyszkowski is Vice-president of the chapter and a member of the Board of Directors of the New York State Association. He is employed as manager of the Motor Department of the United Motor Service, Buffalo Branch.

DAYTON CHAPTER

September 25—After the usual routine of business had been disposed of, the meeting was devoted almost entirely to future programs. Among those decided upon are "The methods and problems encountered in changing from Freon refrigerant to methyl chloride," scheduled for October 9th. A banquet for the members and their wives to be held at the Engineers Club on October 28rd. This banquet to be free to the members and the entire expense to be taken from the treasury. The possibilities of getting the Columbus Chapter to collaborate in a tour through the Ranco plant at Columbus was discussed for November 18th. Further business details were attended to following this program discussion and refreshments were served after adjournment.

KOLD-HOLD ACQUIRES SAVAGE TRUCK PLATE DIVISION

THE sale of the Truck Plate Division of the Savage Arms Corp., of Utica, N. Y., to the Kold-Hold Mfg. Co., Lansing, Mich., has just been announced. The transaction includes all of the machinery, patents, and good will of the Truck Plate Division of the company, according to J. R. Tranter, president of Kold-Hold.

Kold-Hold, which has long been a leading factor in the truck refrigeration field serving the ice cream, frosted foods, meat and locker plants industries, will continue to service all Savage truck plates now in use for the convenience of present users, it was stated.

The acquisition of the Savage business fits in with the greatly expanded program undertaken by Kold-Hold which includes a new factory recently built at 424 North Grand St., Lansing, Mich.

Officials of Kold-Hold expressed gratification over the purchase. It was pointed out that the Savage Arms Corp., with its greatly accelerated defense volume, felt that its Truck Plate business should be continued by a firm which they felt could carry on the high standards of service established on its truck plate operations over the years and that the deal with Kold-Hold assures this continuance.

J. R. Tranter is president of the Kold-Hold Mfg. Co. and E. A. Thiele is vice-president.

* * *

AMERICAN INJECTOR COMPANY ANNOUNCE PROMOTIONS

H. B. TRIX, President of American Injector Company, Detroit, Michigan, announced recently the promotion of Edward Kellie to the position of Vice-president; John L. Trix as Secretary; and S. C. Budd, Treasurer.

* * *

AVRGAIRE FEATURES COLD ANTICIPATION

RECENTLY introduced by Penn Electric Switch Co., Goshen, Indiana, Avrgaire controls give the refrigeration industry an entirely new principle . . . Cold Anticipation. This amazing cold-control for walk-in coolers, reach-in boxes, display cases and all other above-freezing applications aver-

National Refrigeration Supply Jobbers Association Member

MUTUAL UNDERSTANDING

• Every transaction between you and a **N.R.S.J.A.** jobber is based on mutual understanding.

He recognizes the absolute necessity for prompt and efficient service. He recognizes his obligation to serve you without unnecessary loss of t i m e, which will contribute to your objective of better service and will reflect in better business for both.

Depend upon your **N.R.S.J.A.** jobber. His success is dependent upon yours.

NAT'L REFRIGERATION SUPPLY JOBBERS ASS'N

PRACTICAL

HUNDREDS USE THIS
$18 Temperature Recorder
TO SIMPLIFY SERVICE WORK

WHY DON'T YOU?

Why work the hard way? This portable Practical Thermometer simplifies service work . . . locates trouble, tests installations easily and accurately. Furthermore, you can certify your service work with complete 24-hour graphs permanently recorded in ink on paper charts. Guaranteed.

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PRACTICAL INSTRUMENT CO.
2717 N. Ashland Ave.
Chicago, Ill.

$18 with metal carrying case
PRACTICAL RECORDING THERMOMETER
Buy from your supplier

KRUPP DRYERS are filled with either Calcium Chloride, Activated Alumina, Silica Gel or Drierite.

PARTS for SERVICE MEN

KRUPP-MADE means HIGH-GRADE

Dehydrators . . . Strainers . . . Line Valves . . . Shut-off Valves . . . Water Regulators . . . Gauge Sets . . . all made by Krupp, all of the very best quality. Precision manufacturing and first-rate engineering pay dividends to you in fewer call-backs and satisfied customers. Don't fail to write for our new catalog.

CYRUS SHANK COMPANY

625 West Jackson Blvd. Chicago, Illinois

ages box temperature and coil temperature to:

(1) Maintain box temperature within 1° of desired point without short-cycling the compressor.

(2) Provide selective defrost . . . automatic coil defrosting when the box is loaded with warm produce and extra cooling capacity is essential.

(3) Maintain proper humidity and thus prevent "sliming" or "freezer-burning."

The efficient performance of Avrgaire controls is the result of a totally new concept of single temperature bulb application, according to the manufacturer. One portion of the bulb is attached directly to the coil while the remainder hangs free in the air. Thus bulb action is influenced by a temperature drop in the coil before box temperature is affected by more than a fraction of a degree. Because of the more efficient use of the coil's cooling capacity, much smaller swings in box temperature occur. Excessively low coil temperatures which necessitate frequent defrosting are avoided. In addition, harmful variations in humidity are prevented since a uniform spread is maintained between the temperatures of the coil and the air in the box.

FEDDERS ANNOUNCE NEW SALES MANAGER

FEDDERS Manufacturing Company, Inc., Buffalo, N. Y., announces the appointment of Clarence E. Scott as Sales Manager of its Air Conditioning Division.

CLARENCE E. SCOTT

After graduating from the University of Kentucky with a degree in mechanical engineering, Mr. Scott became well known in

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1. Hermetic Units / Compressors — Parts
2. Parts — Compressors — Evaporators Frigidaire—Kelvinator—Norge / General Electric and etc.
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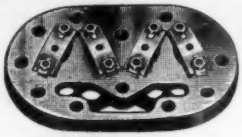

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Write Today for our 88 page Catalog . . . Illustrates, Describes Thousands of Different Parts at List Prices

HASCO, INCORPORATED GREENSBORO NORTH CAROLINA

the heating field as Research Engineer for York Heating and Ventilating Corporation, Philadelphia, Pa.; later as manager of unit heater department of Carrier Corporation; and recently Manager of radiation and unit heater department of Warren Webster Co. Mr. Scott now takes the sales position formerly held by Edmund R. Walker who has been promoted to Assistant General Manager of Fedders Manufacturing Company, Inc.

* * *

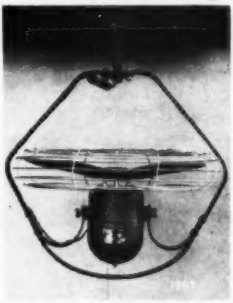
USES WASTED CEILING HEAT AND HELPS SAVE FUEL

ANYONE who has ever climbed to the ceiling of a heated room, knows that it is 20° to 30° hotter there than at the floor. It's just that much heat wasted—just that much wasted fuel.

Fuel will be scarce this winter. There will be a stringent restriction on its use, for the National Defense Program requires every pound of fuel that citizens can spare.

If the wasted ceiling heat could be brought down to heat the lower part of the room, it would make a substantial reduction in the amount of fuel used, thus contributing to the Defense needs of the nation, as well as save considerable money for the user.

That's just what the Reco Heat Circulator does. It's a mechanical magician that takes the ceiling heat and the heat "pockets" that exist over radiators and registers, and



circulates this previously wasted heat throughout the room.

The Reco Heat Circulator is a super power fan that blows the air to the ceiling, then down the walls and back again, causing complete air circulation in the room and providing uniform temperature. This results in a big reduction in the amount of fuel required to keep the room comfortable.

IF IT'S A

SERVEL...

YOU CAN CHECK THE CHARGE INSTANTLY

All Servel receivers are equipped with unique liquid level test cocks, which permit an instant check of the refrigerant charge. A twist of the wrist—and the Servel test cock answers the question, "Is the system fully charged?" Write for free test cock key to Servel, Inc., Electric Refrigeration and Air Conditioning Division, Evansville, Indiana.

AIR-CONDITIONING *simplified*

At last, here is a simplified treatment of air conditioning, presenting it clearly, completely and in detail.

AN AIR-CONDITIONING PRIMER

The ABC of Air-Conditioning—by Wm H. Stangle

234 pages, 213 illustrations, $2.50

A plain, thorough introduction to air-conditioning, giving the main factors of its systems and problems under four simple headings—Heat, Air, People, Enclosures—and covering in detail the methods and apparatus by which they are applied.

FULLY EXPLAINS

what air-conditioning is, what it can do, its technical fundamentals, the methods of applying them, and the many types of equipment available and how they work.

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CONTROL REPAIR SERVICE

Domestic Controls reconditioned equal to new at a small cost. All work guaranteed for one year. Prices upon request.

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SURE THING!! if Blythe hasn't got it . . then nobody's got it!!

H. W. BLYTHE COMPANY

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JARROW REPLACEMENT **DOOR GASKETS**

Practically all jobbers stock them because service men universally prefer them.

FOR ALL POPULAR MAKES OF REFRIGERATORS

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COLD CONTROLS & EXPANSION VALVES

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at the following prices, F.O.B. Chicago

Automatic Expansion Valves (All Makes)	$1.25
Thermostatic Expansion Valves	3.00
Automatic Water Valves	2.00
Domestic Cold Controls (Modern Type)	2.00
Commercial Controls (Temp. or Pressure)	2.50
Commercial Dual Controls	3.00

ALL WORK GUARANTEED FOR 90 DAYS

Write for quantity prices

NEW DUTY

2424 Irving Park Blvd., CHICAGO

As a result of the complete air circulation all smoke and cooking or other odors are dissipated and the room is supplied with a constant flow of fresh invigorating air without annoying drafts.

The Reco Heat Circulator is manufactured in many sizes and types by the Reynolds Electric Company, 2650 W. Congress Street, Chicago, Illinois.

NEW CATALOG AND BULLETINS

Detroit Lubricator Company, Detroit, Michigan, have just issued a new sixteen page pamphlet, illustrating and describing their solenoid valves. In addition to the complete listing of all the valves manufactured by the company, it shows in clearly illustrated description the operation and construction of each valve. Diagrams provide visual instructions on methods of using the valves in refrigerating system and convenient tables provide both liquid line and suction line capacities where the various size valves are used. Other tables provide air line capacities, water line capacities, ordering data and other useful information to the user of solenoid valves. Copy of the bulletin may be secured upon request.